Ganga River Basin Management Plan-2015



Volume 7: Thematic Studies – Demographic, Socio- Economic, Urbanization & Industrialization

Centre for Ganga River Basin Management and Studies
Indian Institute of Technology Kanpur

VOLUME 7 OF 12

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NMCG is the implementation wing of National Ganga Council which was setup in October 2016 under the River Ganga Authority order 2016. Initially NMCG was registered as a society on 12th August 2011 under the Societies Registration Act 1860. It acted as implementation arm of National Ganga River Basin Authority (NGRBA) which was constituted under the provisions of the Environment (Protection) Act (EPA) 1986. NGRBA has since been dissolved with effect from the 7th October 2016, consequent to constitution of National Council for Rejuvenation, Protection and Management of River Ganga (referred to as National Ganga Council).

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ACKNOWLEDGEMENT

This document is a collective effort of a number of experts, institutions and organisations, in particular those who were instrumental in preparing the Ganga River Basin Management Plan which was submitted to the Government of India in 2015. Contributions to the photographs and images for this vision document by individuals are gratefully acknowledged.

SUGGESTED CITATION

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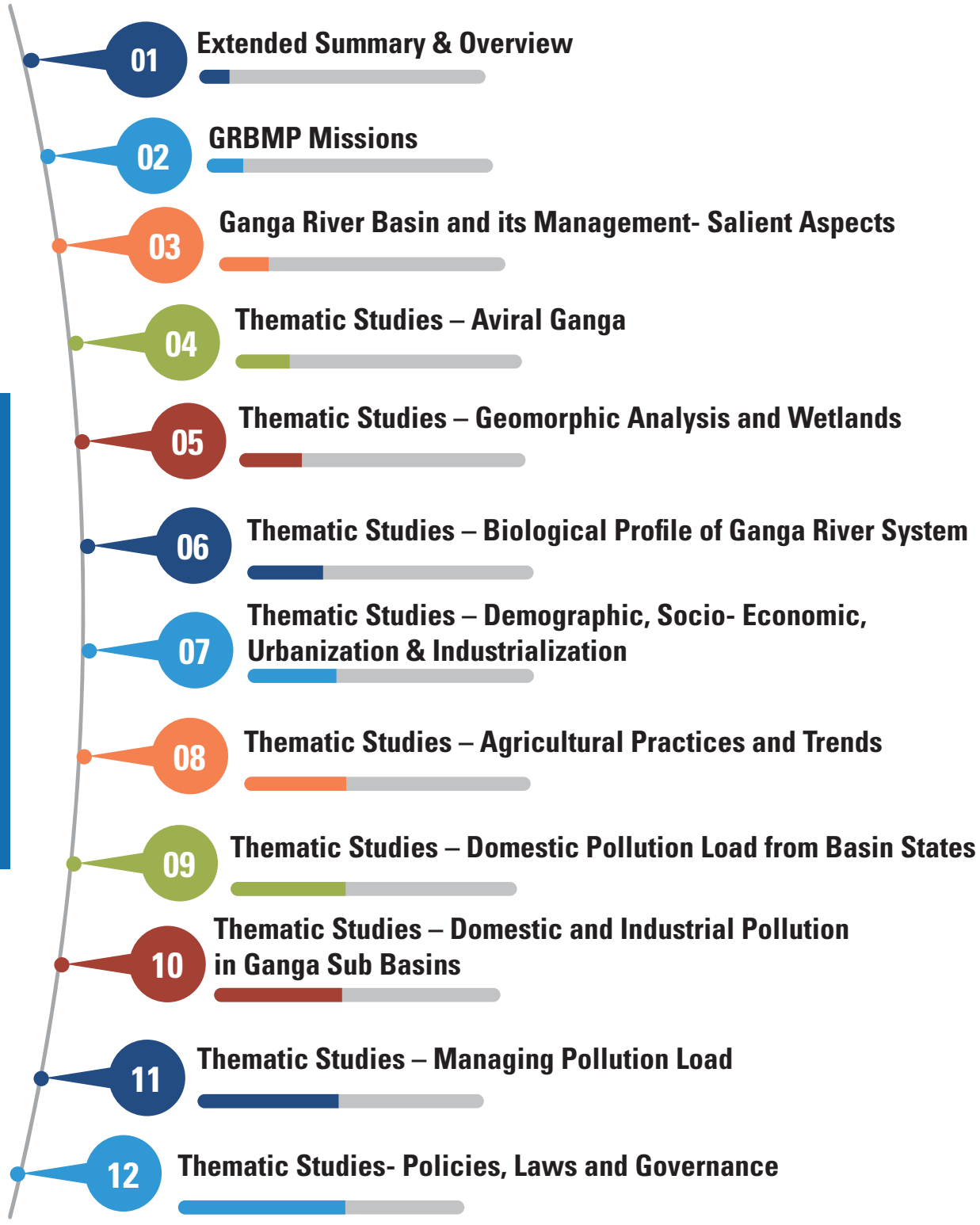
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GANGA RIVER BASIN MANAGEMENT PLAN - 2015

Volume 7: Thematic Studies – Demographic, Socio- Economic, Urbanization & Industrialization

12 VOLUMES





Ganga river in
Himalayas mountains

Demographic and Socio-Economic Analysis

of the Upper Ganga Basin

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology









IIT Bombay	IIT Delhi	IIT Guwahati	IIT Kanpur	IIT Kharagpur	IIT Madras	IIT Roorkee

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Frame Work for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who have contributed directly and those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction

Population growth has several links with environmental degradation. It is one of the key factors in the over-exploitation of water and other natural resources. The relationship between population and water is viewed as a two-way process, i.e., instead of regarding population growth as the only cause of water shortages, water availability will also be considered as a possible push or pull factor in explaining migration pattern and other socio-demographic outcomes (Rashid & Kabir, 1998). Therefore, for effective and sustainable management of the Ganga Basin, an understanding of, inter alia, growth and composition of population, sectoral composition of work force, change in land and water use patterns, livelihood pattern and their possible impact on the river water resources is imperative. Therefore, management of the Ganga basin is required to be viewed as part of the broader environment and in relation to socio-economic demands and potentials, while at the same time acknowledging the political and cultural context. Keeping these aspects in view, the present study examines the demographic and socio-economic factors in Upper Ganga Basin – primarily the state of Uttarakhand and their implications for the GRBMP.

Figures and facts documented and analyzed in the report are based on secondary data collected from various sources, including Statistical Diary and Statistical Abstracts published by the Government of Uttar Pradesh before constitution of state of Uttarakhand and Government of Uttarakhand after Statehood. Population Censuses, Family Health Survey (NFHS) and NSSO reports represent important sources of data for the study.

2. Upper Ganga Basin: State of Uttarakhand

Uttarakhand is located between latitudes 29°5'-31°25'N and longitudes 77°45'-81°E covering a geographical area of 53,485 km^2 of which 93 percent is mountainous. The region comprises two administrative zones viz., Garhwal (northwest portion) and Kumaon (southeast portion). A separate state 'Uttaranchal' comprising 13 districts of these two administrative zones and the erstwhile district of Haridwar from Uttar Pradesh was carved out as the 27th state of the Republic of India on 9th November 2000 with its capital located at Dehradun. Subsequently in January 2007, the name of the state was officially changed to Uttarakhand. About 34,650 km^2 area of the state is reported to be under forest cover which corresponds to 64.8 percent of the total geographical extent. However, as per the information available from latest satellite imageries the actual forest coverage is assessed to be only 44 percent[1].

As per the 2011 census, average population density in the state is 189 persons per km^2, however in the hilly region this will be significantly lower than then plains. With over fifteen important rivers and over a dozen glaciers in the state, Uttarakhand represents a valuable fresh water reserve for most of the northern part of India. The average annual rainfall in the state is recorded to be around 1,547 mm.

For administrative purposes, the state has been divided into two sub-divisions, viz., Kumaon and Garhwal. Kumaon division includes six districts, namely, Almora, Bageshwar, Champawat, Nainital, Pithoragarh, and Udham Singh Nagar; while Garhwal division consists of seven districts, viz., Dehradun, Haridwar, Pauri, Rudraprayag, Tehri and Uttarkashi. The state has 78 tehsils, 95 development blocks, 671 Nyaya Panchayats, 7,227 Gram Panchayats and 15,761inhabited villages[2]. Figure 1 depicts the geographical location of the state of Uttarakhand with all its 13 districts. The state shares the international boundary with Tibet in the wide northeast and with Nepal in the southeast. The state is also bounded by state of Himachal Pradesh in the north-west and Uttar Pradesh in the south.

As per the Census 2011, total population of the state is 8.49 million. The growth rate of the state population has shown a declining trend from 24.2% during 1981-91 to 19.2% during 2001-2011. For 2011 the schedule castes and schedule tribes population constitute about 18% nad 3% respectively. Average literacy rate is around 80% while sex ratio is 963.



Map 1: Location of Uttarakhand (with districts) in the Ganga Basin and in India

The work force constitutes 37 percent of total population, of which 74 percent are main workers and 26 percent are marginal workers. Out of the total workforce, 1.57 million are cultivators (including main and marginal cultivators), 0.26 million are agricultural labourers, 0.07 million people work in household industries and 1.23 million people are engaged in other activities.

Almost 70 percent of the population is engaged in agriculture and therefore the sector represents major source of livelihood of the population in the state. Out of the total reported area, only 14 percent is under cultivation and over 55 percent of the cultivated

land in the state is rain-fed with cropping intensity at 161 percent. Agriculture covers 7.81 lakh hectares of land, out of which 4.43 lakh hectares (56.8 percent) is in hill region, while the plain region constitutes 3.37 lakh hectares (43.2%). In the hill region the irrigated area is only around 10 percent of the total cultivable area whereas in the plains it is around 85 to 90 percent. Average size of land holding is around 0.68 hectare in the hills and 1.77 hectare in the plains. Of the total 9.26 lakh farmers in the state, small and marginal farmers constitute around 88 percent. Subsistence nature of agriculture in the hill districts provides nothing but a low and unstable annual income to the people, causing a sizeable out-migration of male members of families, leaving behind a large number of female-headed households. As per the BPL survey of 2008, about 36.5 percent of the population of the state lives below poverty line.

3. Demographic Characteristics

3.1. Trends in Population Growth

Figure1 presents the population growth trends in the State of Uttarakhand for the last 11 decades (1901-2011) along with the corresponding decennial growth rates. The state added about 9.66 lakhs persons during 1901-1951, comprising the decade of 1911-21 which was a historical low in Indian population. Post-independence after 1951, the proportionate addition in population rose multifold. Over the 30 year period from 1951-1981 there was a net addition of 27.8 lakh persons and which represents the fastest growth period. . Further in the subsequent 2 decades, the state population sharply increased by 43.5 percent from 70.51 lakhs in 1991 to 101.17 lakhs in 2011. As far as decennial growth rate is concerned, after 1951, it has shown a steady rise till 1981 and thereafter there has been a deceleration.

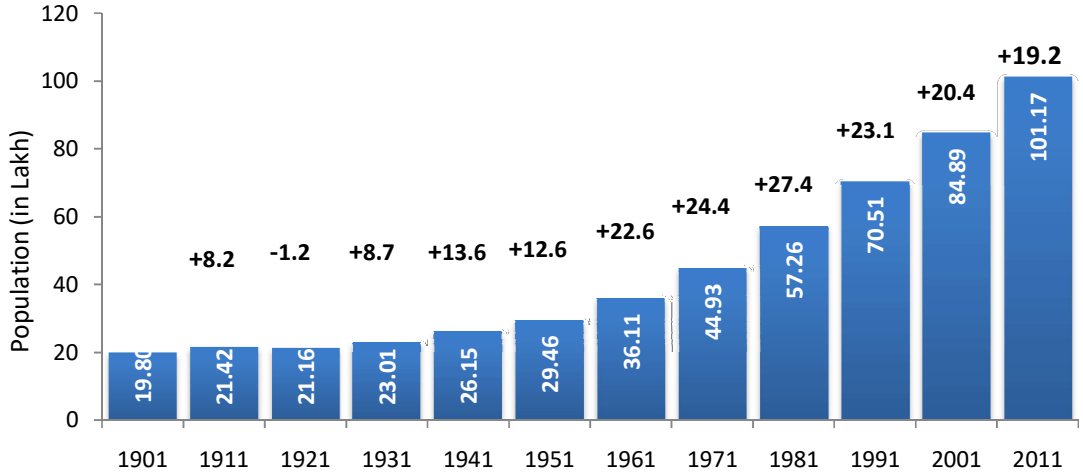


Figure 1: Trends in Population and Population Growth Rate (%), in Uttarakhand, 1901-2011

Figure 2 shows district-wise decadal population growth trends in the State for the last 40 years. It is found that in most of the districts population growth rates have decelerated since 1971. While growth rates vary significantly across districts it is interesting to note that during 2001-11, in the case of the two hilly districts of Pauri Garhwal and Almora negative growth was recorded and in the case of Udhamsingh Nagar which is in the plains highest growth was observed. In general population growth rates in almost all hill districts have been quite low. Map-2 presents variations in population growth of various districts.

The district-wise population growth pattern brings out the dichotomy of Uttarakhand. Over the years population of plain districts e.g., Udhamsingh Nagar, Haridwar and Dehradun has increased significantly, while in the case of hilly districts, population has increased at a moderate rate or declined in some districts. Deceleration of population growth rates in hilly regions can be attributed to migration which is resulting due to poor infrastructure and lack of employment opportunities. On the other hand, plain districts are the centres of attraction on account of highly fertile land, better irrigation, improved infrastructure and connectivity with rest of the country. Plains also offer better facilities for health care and education.

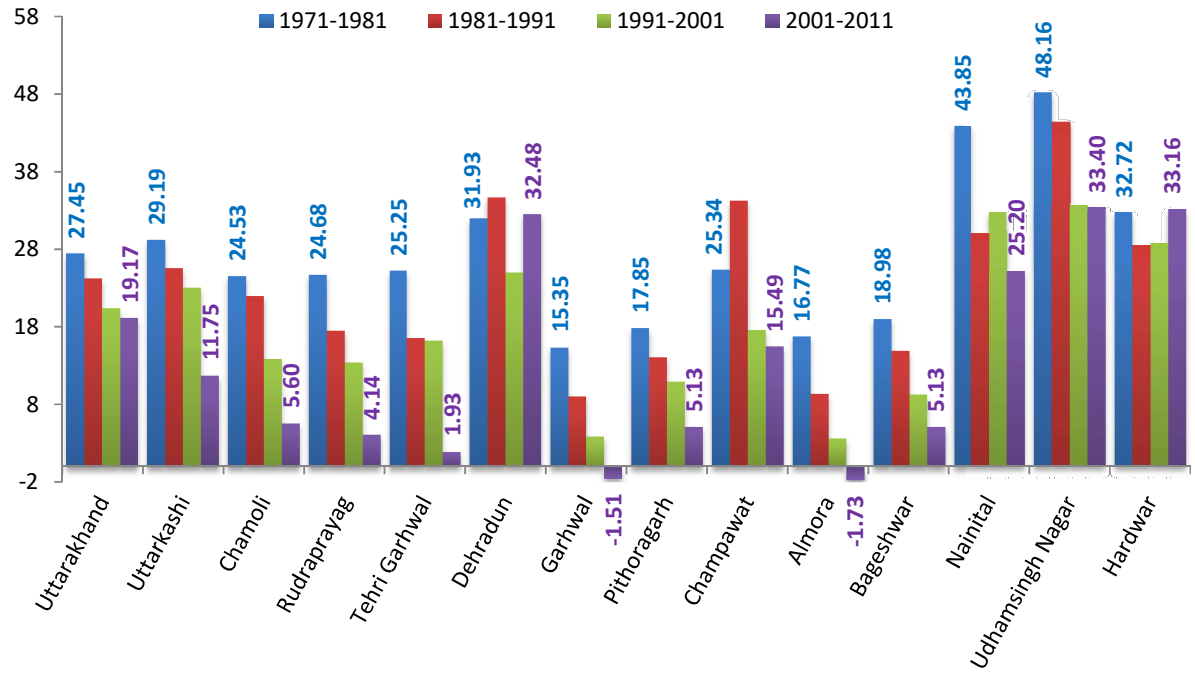


Figure 2: Trends of Decennial Population Growth Rate (%) in Uttarakhand, 1971-81 to 2001-11



Map 2: Decennial Population Growth Rate (%) across Districts of Uttarakhand, 2001-11

3.2. Trends in Natural Growth Rate

Birth rate indicates the number of live births per 1,000 people in a reference period. Subtracting the death rate from the birth rate provides the rate of natural increase, which is equal to the rate of population change in absence of migration. Information on district-wise birth and death rate (along with other mortality indicators) made available by the recently concluded Annual Health Survey 2010-11 (Govt of India, 2012) under the aegis of the Registrar General of India provides an opportunity to assess natural growth rate across districts. Figure 3 shows trends in birth rate, death rate and natural population growth rate in the State since 1999 while Figure 4 presents the birth, death, and the natural growth rates across districts. It is noted that while death rate has almost stabilized, it is the birth rate which induces more variation in the natural growth rate of population. During the last five years, birth rate shows a constant decline and as a result, natural growth rate in population also follow similar trend.

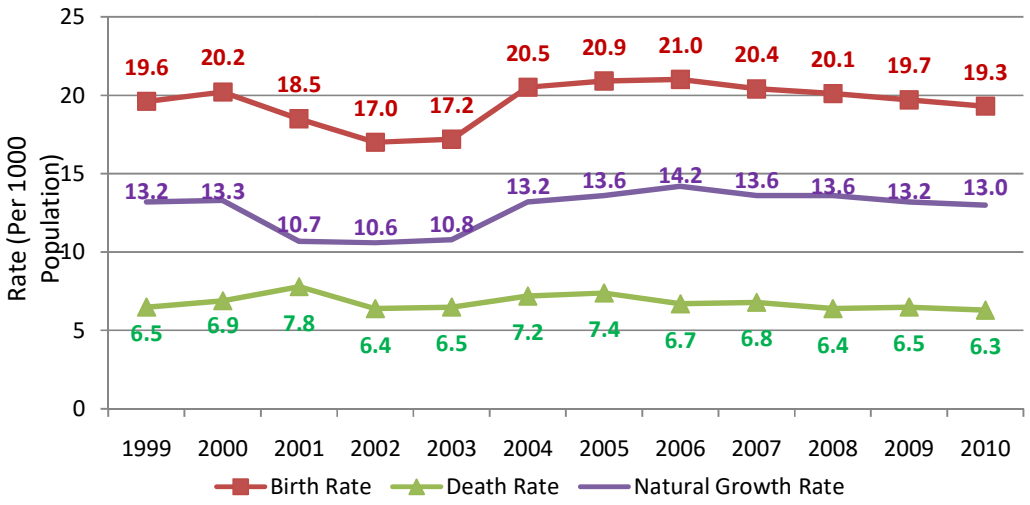


Figure 3: Birth, Death, and Natural Growth Rate (per 1000 population), Uttarakhand, 1999-2010

From Figure 4 it is interesting to observe that unlike decennial population growth which was much lower in the hill districts than the plain districts, the difference in the natural growth rate in population between hill and plain districts is not so significant. Although natural growth rate of population is not comparable with the decennial growth rate, it provides an important clue that the relatively low decennial population growth in the hill districts is not due to their low natural growth rate - which is almost comparable with the plain districts, it is the high intensity of migration from hill regions to the plain regions that causes low population growth in hill districts and high population growth in the plain districts.

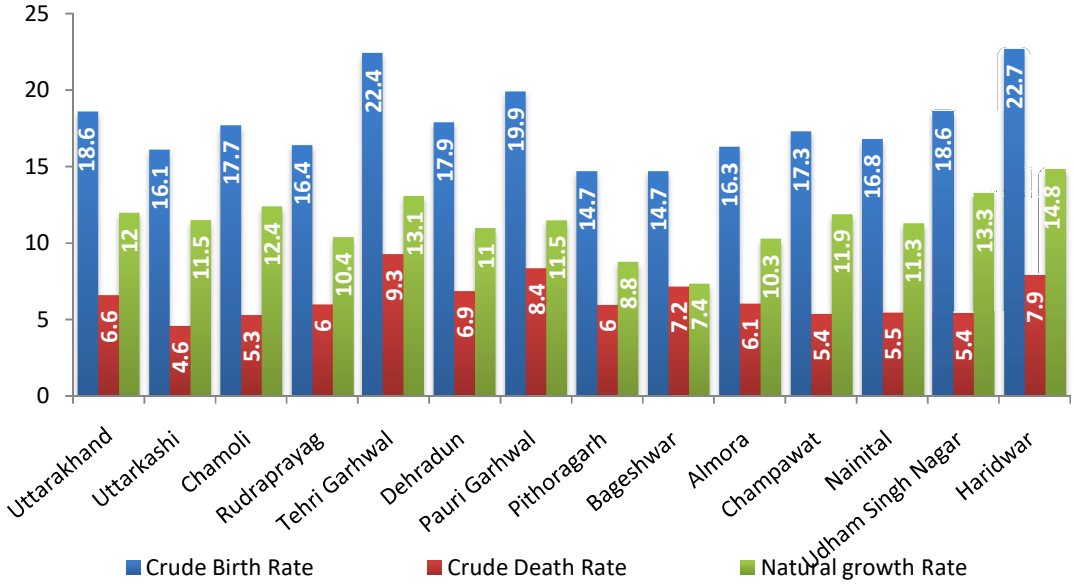


Figure 4: Birth, Death, and Natural Growth Rate (per 1000 population) across districts of Uttarakhand, 2010-11

Table 1 shows district-wise rural-urban break up of crude birth rate (CBR), crude death rate (CDR) and natural growth rate (NGR) of population. On an average, these rates are higher in rural than the urban areas. For instance, natural growth rate of population in rural areas is 12.4 per 1000, while in the urban areas it is only 11 per 1000. A perusal of Table 1 brings out a significant variation in all the three rates across districts. Table 1 also demonstrates that on an average CDR is much higher in male population than the female population in rural and urban areas both. The analysis of these rates reveals that rural population has relatively lesser healthcare facilities and consequently all the three rates are higher. It may also be concluded that in general access to healthcare facilities for female population in both rural and urban areas is lesser than the male population, as is obvious from the corresponding values of CDR.

Table 1: District wise Birth, Death, and Natural Growth Rate (per 1000 population) across districts of Uttarakhand, 2010-11

Uttarakhand / Districts	Crude Birth Rate (CBR)			Crude Death Rate (CDR)									Natural Growth Rate		
				Total			Rural			Urban					
	T	R	U	T	M	F	T	M	F	T	M	F	T	R	U
UTTARA-KHAND	**18.6**	**19.3**	**16.7**	**6.6**	**7.9**	**5.4**	**7**	**8.5**	**5.5**	**5.7**	**6.5**	**4.9**	**12**	**12.4**	**11**
Uttarkashi	16.1	16.6	12.5	4.6	5.5	3.7	4.7	5.7	3.8	3.8	4.7	2.8	11.5	11.8	8.7
Chamoli	17.7	17.9	16.7	5.3	6.6	4	5.7	7.2	4.3	3.2	4	2.3	12.4	12.2	13.5
Rudraprayag	16.4	16.5	-	6	8.2	4.1	6	8.2	4.2	-	-	-	10.4	10.5	-
Tehri Garhwal	22.4	23.1	17.8	9.3	11.9	7.2	9.7	12.7	7.3	6.9	7.4	6.3	13.1	13.4	10.9
Dehradun	17.9	20.7	15.9	6.9	7.8	5.9	7.4	8.7	6.1	6.5	7.2	5.8	11	13.3	9.3
Pauri Garhwal	19.9	20.5	16.4	8.4	10.4	6.6	8.8	11	6.9	6	7	4.9	11.5	11.7	10.5
Pithoragarh	14.7	15.4	11.8	6	7.7	4.4	6.6	8.5	4.9	3.1	4.1	2	8.8	8.8	8.7
Bageshwar	14.7	14.7	13	7.2	9.3	5.3	7.3	9.3	5.4	7	9.1	4.8	7.4	7.5	6
Almora	16.3	16.7	12.1	6.1	8.1	4.3	6.2	8.3	4.3	4.3	5.2	3.3	10.3	10.4	7.8
Champawat	17.3	17.1	18.2	5.4	7.1	3.7	5.5	7.4	3.6	4.8	5.5	4	11.9	11.6	13.4
Nainital	16.8	16.6	17.1	5.5	6.4	4.6	6	7	4.9	4.9	5.5	4.2	11.3	10.6	12.2
U. S. Nagar	18.6	19.1	17.9	5.4	6.2	4.4	5.7	6.6	4.6	4.8	5.5	4	13.3	13.4	13.1
Haridwar	22.7	25.3	18.1	7.9	8.6	7.1	8.3	8.9	7.7	7.1	8	6.1	14.8	17	10.9

Note: T=total, M=male, F=female, R=rural, U=urban

Source: Annual Health Survey Uttarakhand, 2010-11

3.3. Distribution of Population

Figure 5 brings out predominance of rural population however, the share of population living in urban areas has been continuously increasing. As per the Census 2011, about 31 percent population in the state resides in urban areas compared to 69 percent in rural

areas. There has been a constant rise in urban population, even in small towns in the country during the last two decades, more specifically due to migration compared to the natural increase, and also due to the inclusion of new areas under 'urban' category/ merging of peri-urban areas in municipal limits.

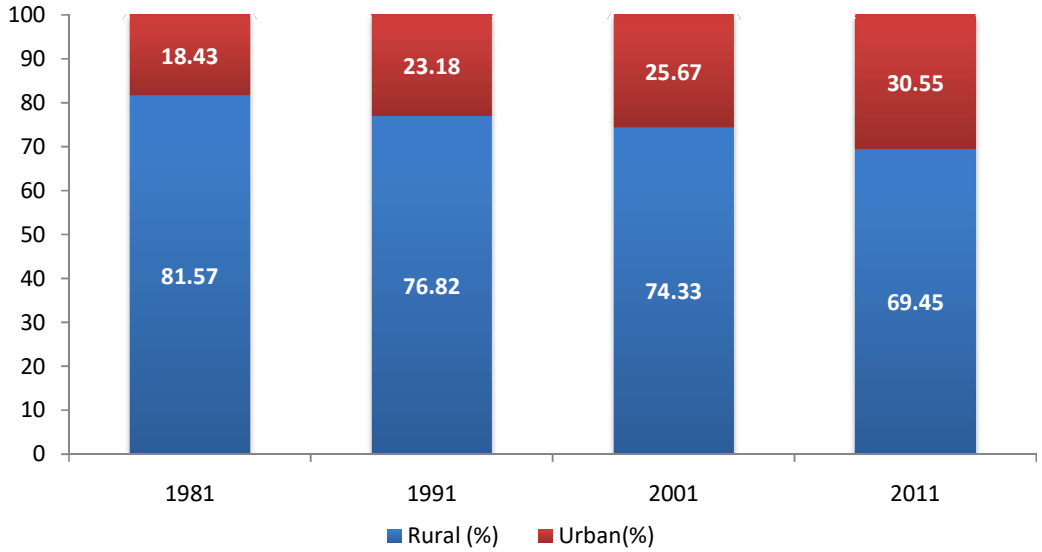


Figure 5: Distribution of population by Place of Residence, 1981-2011 Uttarakhand

Figure 6 shows share of different districts in the total rural and urban population in the State in 2011. The Figure also demonstrates the district-wise level of urbanization. A perusal of the Figure reveals that three plain districts, namely Haridwar, US Nagar and Dehradun together constitute 52 percent of total population of the State. Haridwar district comprises the highest share (19%) in the total population of the State, followed by Dehradun. These three districts together constitute only 43 percent of total rural population of the State, whereas their share in the total urban population is 74 percent. This shows that concentration of urban population is mainly in the plain districts of the state. Ten hill districts together comprise only 26 percent of total urban population, while their share in the rural population is much higher at 57 percent. If the hill district of Nainital is excluded from consideration (which accounts for 12 percent of urban population of the State), remaining nine hill districts together have only 14 percent of total urban population of the state.

Two key points emerge from the analysis of the Figure 6. First, there is a significant difference in the distribution of population across districts. Districts located in plain region have the highest concentration of population, while the hill regions are thinly populated. Second, the proportion of urban population is much higher in plain districts than the hill districts. The percentage of urbanization is observed highest in Dehradun (56%), followed by Nainital (39%), Haridwar (38%), and US Nagar (36%). Urbanisation is least in Bageshwar (3.5%), Rudraprayag (4%) and Uttarkashi (7%).

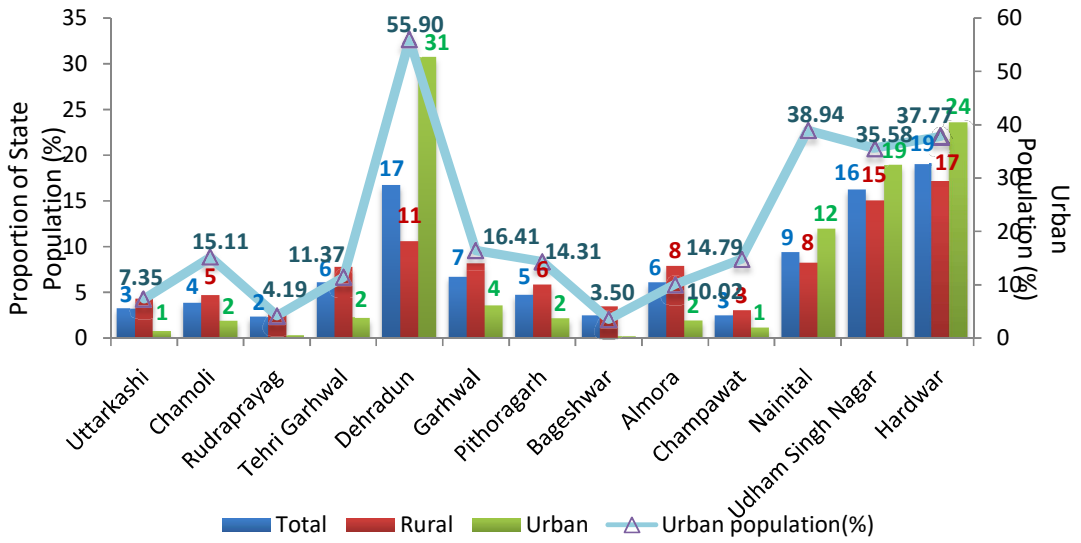


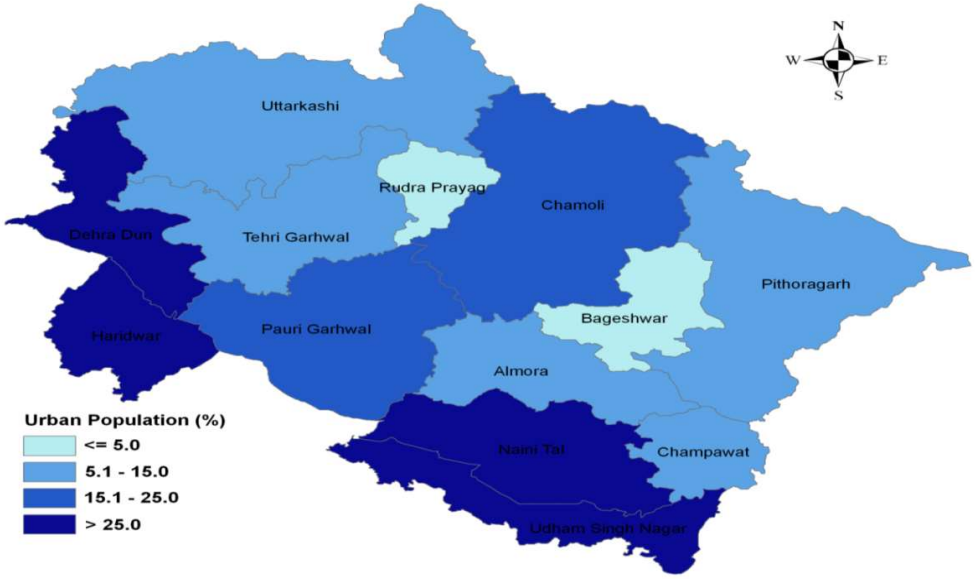
Figure 6: District-wise percentage share in the total State Population and level of Urbanization in 2011

Map 3 also demonstrates that maximum concentration of population in the state is in the three plain districts of the state. These districts individually share more than 15 percent of total population of the State. The share of six hill districts viz., Chamoli, Uttarkashi, Pithoragarh, Bageshwar, Rudraprayag and Champawat in the total population ranges between 2—5 percent.



Map 3: Percentage share of different districts in the total Population of the State in 2011

Map 4 shows district-wise level of urbanization in the State as per the Census 2011. Level of urbanization in four districts viz., Dehradun, Nainital, Haridwar and US Nagar is more than 25 percent, while on the other hand in the hill districts of Rudraprayag and Bageshwar it is least – being under 5 percent.



Map 4: Level of Urbanization across Districts of Uttarakhand in 2011

3.4. Population Concentration

Population concentration characterizes pattern of population distribution in an area. This is represented by the density of population in a particular region/district, and is calculated in terms of persons per unit area. Density of population suggests clustering, scattering, randomness or uniformity in the distribution of population, which further helps to assess population pressure on resources. Figure 7 shows the trends in population density in India and Uttarakhand for the last 11 decades. On average, population density has been much lower in the State than the national average. In Uttarakhand, it has increased from 37 per sq.km. in 1901 to 53 per sq.km. in 1951. Between 1951 and 2011, density of population in the state has increased about 3.5 times, while for the country as a whole it is about 3.25 times. Thus, although population density is higher in India than the state, it has recorded slightly higher increase in the State than India during the last 60 years.

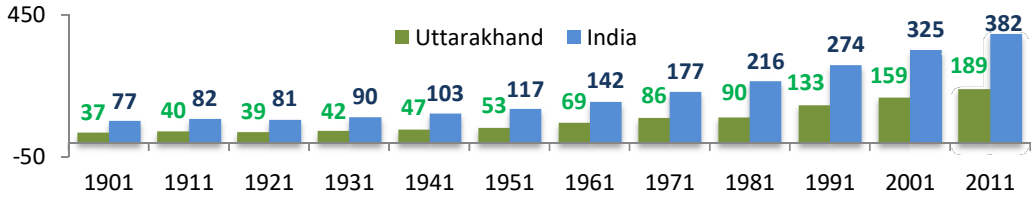


Figure 7: Population Density (Per Sq. Km) in Uttarakhand and India, 1901-2011

District-wise concentration of population during the last three censuses is shown in Figure 8. It is noted that there has been a significant increase in the density of population in the plain districts, while increase in the population density in most of the hill districts is quite low or negligible. In 2011, population density in the districts in plain varies in the range of 817 to 550 while in the hills it is found to be in the range of 41 to 119. High density of population represents potential sources of urban pollution in the Ganga Basin. District-wise variation in population density is presented in M

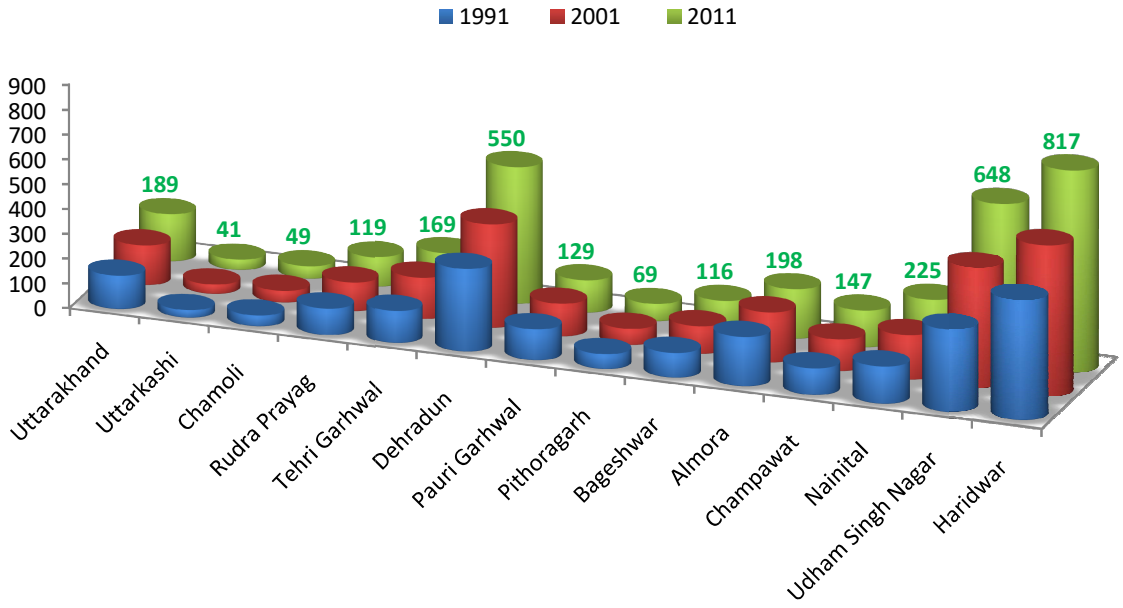
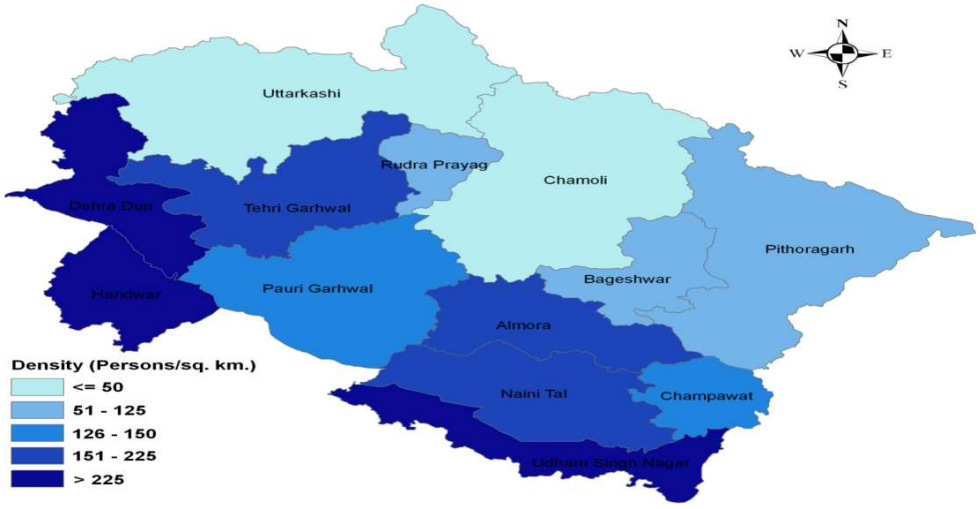


Figure 8: Population Density (Persons/sq.km.) across Districts of Uttarakhand, 1991-2011



Map 5: Population Density (Persons/sq.km.) across Districts of Uttarakhand, 2011

3.5. Population Composition

Population composition refers to the demographic and the social composition, which includes population in different age-group, sex-group, social group, and religious group. Figure 9 presents the age-sex pyramid of population in the state during 2009-10. The figures are estimated from the 66th round of National Sample Survey (NSS) data. The pyramid presents a typical view of the structure of a developing economy, with broad base and narrow top..

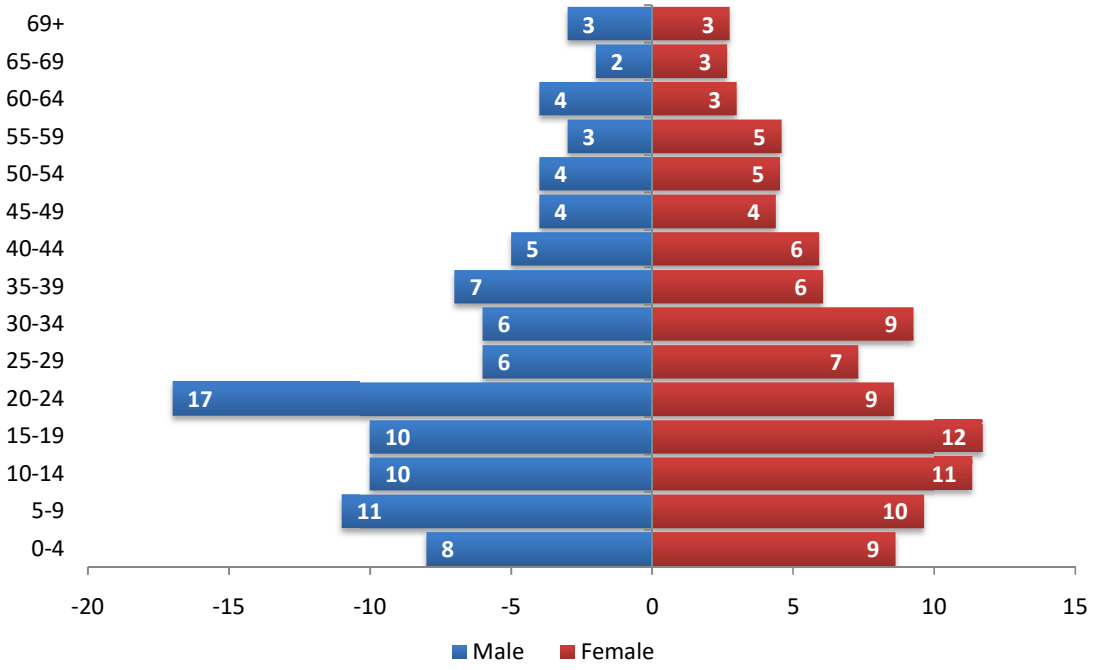


Figure 9: Age-Sex Population Pyramid, Uttarakhand, 2009-10

Table 2: District-wise Population below age 15 years (%) in rural and urban areas, Uttarakhand, 2010

	Total	Rural	Urban			Total	Rural	Urban
Uttarakhand	**31.8**	**33.2**	**28.4**		**Nainital**	**29.4**	**29.7**	**29**
Almora	30.8	31.4	23.9		**P. Garhwal**	31.1	31.6	28.7
Bageshwar	31.5	31.7	28.3		**Pithoragarh**	31.7	31.4	33
Chamoli	32.1	32.4	30.9		**Rudraprayag**	33	33	30.5
Champawat	35.1	35.3	33.8		**Tehri Garhwal**	35.1	35.8	30.8
Dehradun	27.6	30.6	25.5		**U S Nagar**	32.2	33.5	30
Haridwar	34.6	37.9	28.7		**Uttarkashi**	33.9	34.5	29.8

Source: Annual Health Survey Uttarakhand, 2010-11

From Figure-10 it is noted that over the last 11 decades, sex ratio has increased from 831 to rather healthy level of 963 in 2011.

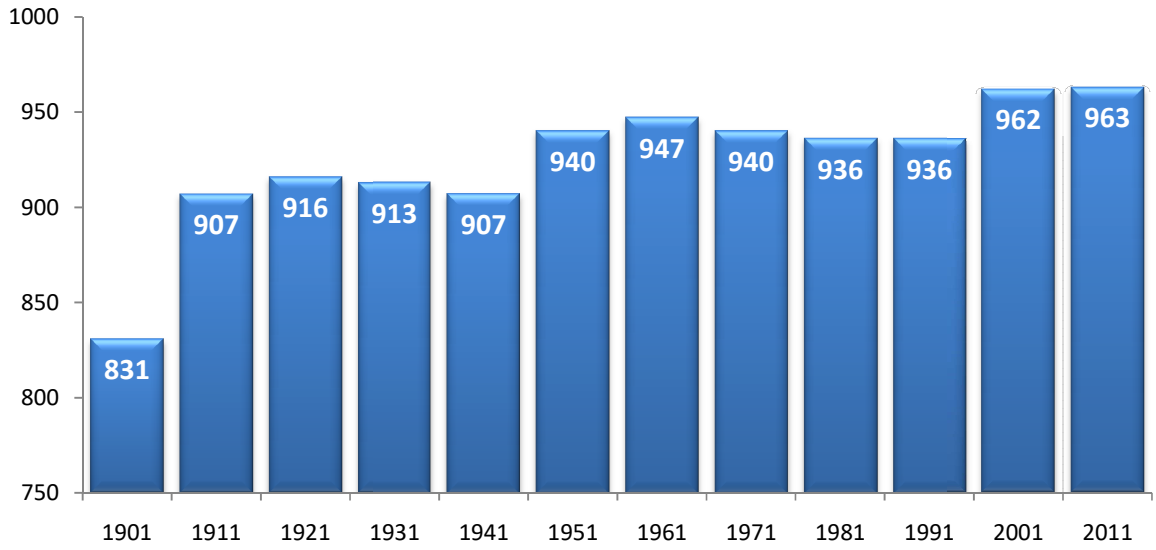


Figure 10: Trends in Sex Ratio (Female/1000 Male), Uttarakhand, 1901-2011

An analysis of district-wise sex ratio shows that in the hills it is rather skewed in favour of female population due to the fact that a large number of male members of families migrate in search of employment to the plains or distant towns. In order to understand whether higher sex ratio in the hill districts is due to migration of male population or due to women empowerment and gender development, sex ratio at birth, 0-4 years and sex ratio of all ages were also considered. Table 3 shows the district-wise sex ratio under the aforementioned three categories. Sex ratio at birth is observed higher in rural areas than in urban areas of the State. A rural-urban comparison of sex ratio at birth shows that although average sex ratio at birth is higher in rural areas, the variation in the sex ratio across districts is much higher in urban area. In rural areas, it ranges from 781 to 914, while in urban areas it varies from 500 to 1017.

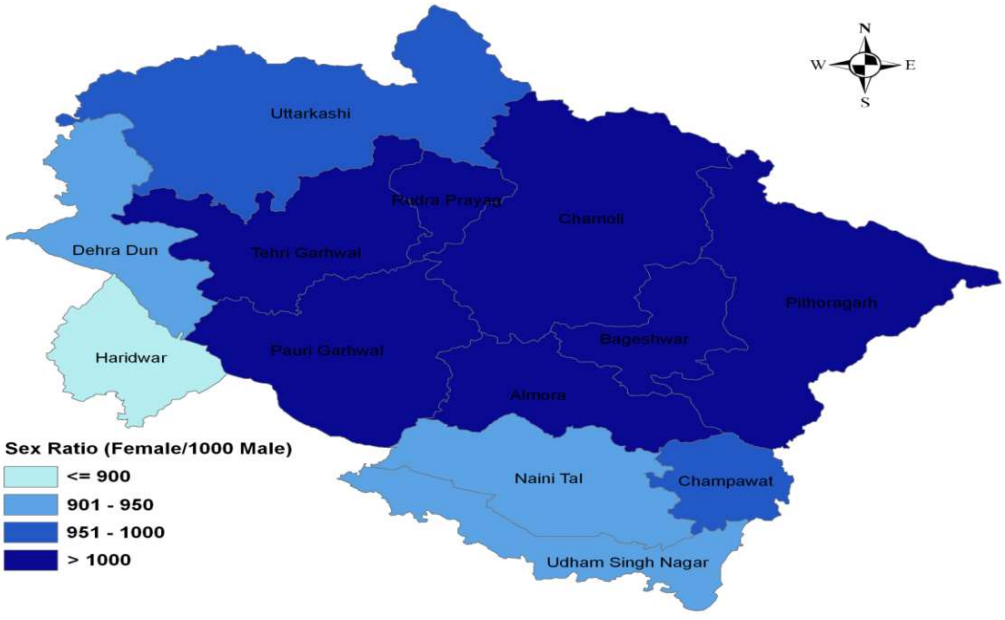
Sex ratio of 0-4 years age group in rural areas is observed to be in the range of 929 to 933 whereas in urban area, it is in the range of 862 to 943. It is relevant to note that there is not much difference between hill and plain districts in sex ratio at birth and at 0-4 years, whereas there is substantial difference in the overall sex ratio (all ages) between hill and plain districts, as is evident from the data shown in Table 3. Except for Nainital district, all other hill districts have sex ratio (all ages) over 1000. This clearly shows that the huge difference in the overall sex ratio between hill and plain districts is mainly due to migration of male population, especially from the rural areas of hill districts to other places.

Table 3: District-wise Sex Ratio at Birth, 0-4 Years, and All Ages in rural and urban areas, Uttarakhand, 2010

UK/District	Sex Ratio at Birth			Sex Ratio (0-4 years)			Sex Ratio (All ages)		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttarakhand	**866**	**877**	**833**	**877**	**888**	**846**	**992**	**1026**	**913**
Almora	874	879	802	896	899	843	1131	1144	968
Bageshwar	823	831	667	880	885	776	1089	1099	925
Chamoli	857	856	864	879	900	781	1045	1077	903
Champawat	880	853	1017	888	877	943	1017	1045	891
Dehradun	836	876	800	865	880	852	944	953	937
Haridwar	870	870	868	847	842	862	881	868	904
Nainital	918	908	932	882	872	896	910	924	890
Pauri Garhwal	885	890	854	912	920	861	1134	1162	989
Pithoragarh	764	781	668	817	844	699	1067	1084	991
Rudraprayag	861	863	500	894	897	586	1194	1200	720
Tehri Garhwal	890	895	843	922	929	867	1220	1273	929
U S Nagar	867	914	787	877	912	817	904	918	880
Uttarkashi	868	882	741	921	933	818	996	1012	891

Source: Annual Health Survey Uttarakhand, 2010

Data collected from the 2011 Population Census also show that there exists a wide variation in the sex ratio across districts (Map-6). As is demonstrated by the Map, 7 out of 10 hill districts of the State have sex ratio more than 1000. On the contrary, all the districts located in the plain areas have the sex ratio much below 1000.



Map 6: Sex Ratio (Female/1000 Male) across Districts of Uttarakhand, 2011

Figure 12 shows composition of population by social groups. General category comprises the highest share (58.80%) in the total population. It is followed by SC category (20%) and OBC (16.70%). ST category consists of only 4.70% of the total population.

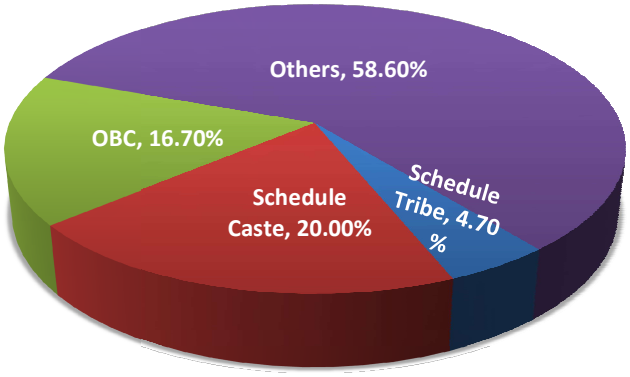


Figure 12: Proportion (%) of Population by Social Group, Uttarakhand, 2009-10

Religious composition of the population shows that the State is dominated by the Hindu Population (85.88% of the total population), followed by Muslims (11.45%). The percentage share of other religions in the total population is very insignificant (Figure-13).

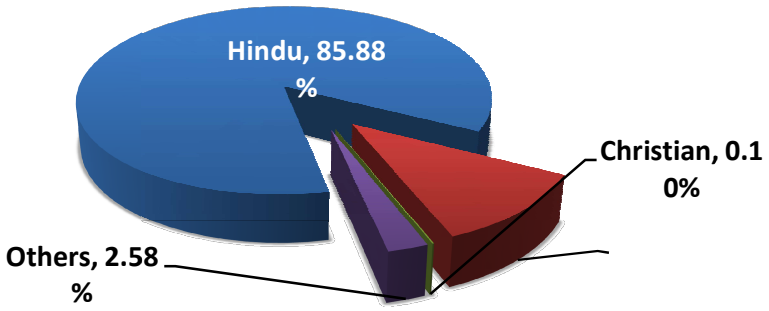


Figure 13: Proportion (%) of Population by Religious Group, Uttarakhand 2009-10

3.6. Population Dependency

Population dependency indicates the potential effects of changes in population age structures for social and economic development, pointing out broad trends in social support needs. This is measured by the dependency ratio, which relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old). A high dependency ratio indicates that the economically active population and the overall economy face a greater burden to support and provide the social services needs of the dependent children and older persons. Figure 14 illustrates the proportion of

population in different age groups during 2009-10. During 2009-10, the State reported 29.5 percent of its population below the age of 15 years, 65.4 percent between 15-64 years, and 5.2 percent above 64 years. The figures are estimated using information retrieved from the 66th round of National Sample Survey (NSS). Based on this information, the child dependency ratio and the aged dependency ratio were computed for the state and its districts.

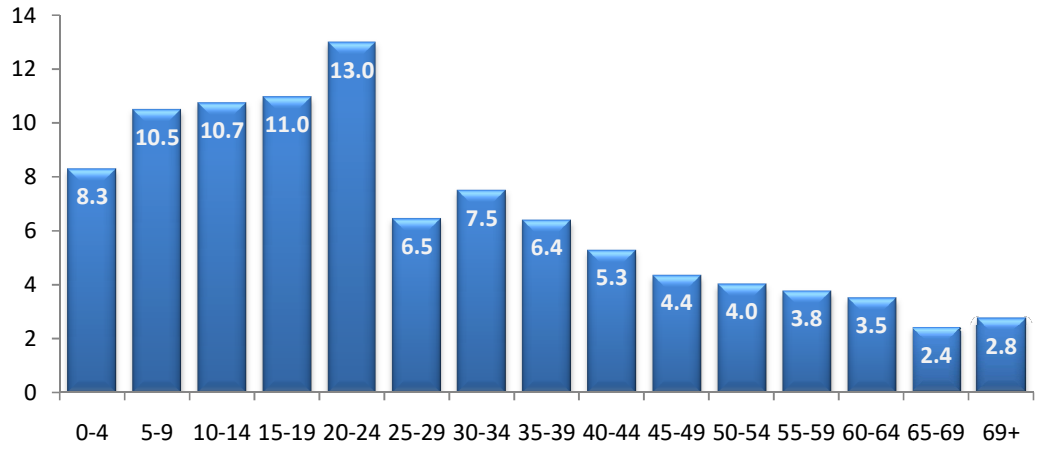


Figure 14: Proportion (%) of Population by Age Group, Uttarakhand, 2009-10

Figure-15 shows the district-wise dependency ratio in rural and urban areas of the State. Overall dependency ratio in the State is estimated to be 69.8 percent. The ratio is found relatively higher in rural areas (75.5%) than urban areas (57.1%). The implication is that the government should investment more in rural development activities so that the working population may generate adequate income to support relatively higher proportion of dependent population (both children and aged people).

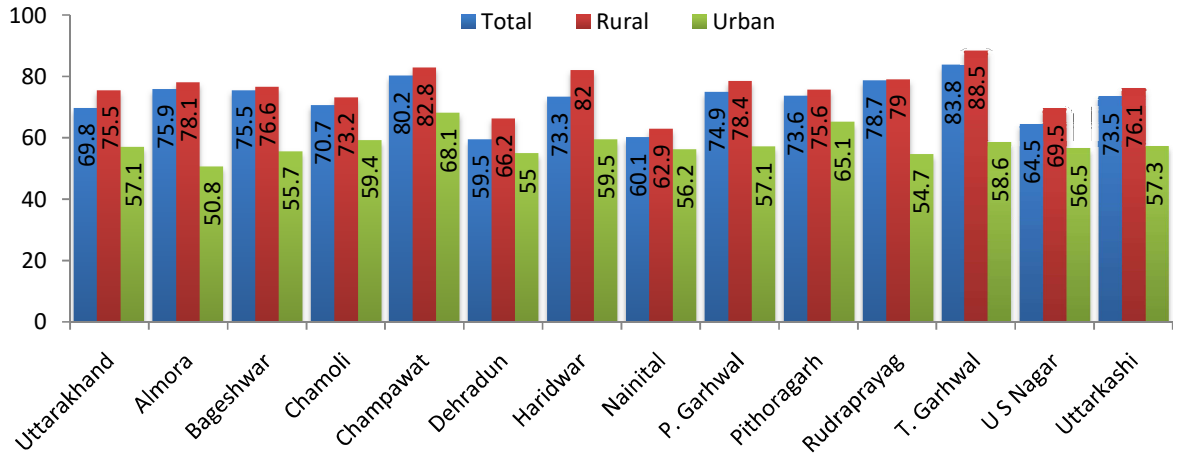


Figure 15: District-wise Dependency Ratio (%) of Uttarakhand, 2010

4. Economic Indicators

4.1. Gross (State) Domestic Product

After getting statehood, Uttarakhand has become one of the fastest growing states of India. Figure-16 shows that the real Gross State Domestic Product (GSDP) of the state has registered a smooth rise from 126.21('00 crores) during 1999-2000 to 275.16 ('00 crores) during 2008-09, adding 148.95 ('00 crores) in 10 years, with an average increase of approximately 14.9 hundred crores every year (Figure 24). Thus, it has registered an increase of 118 percent during the last one decade, with an average growth rate of 11.8 percent per annum

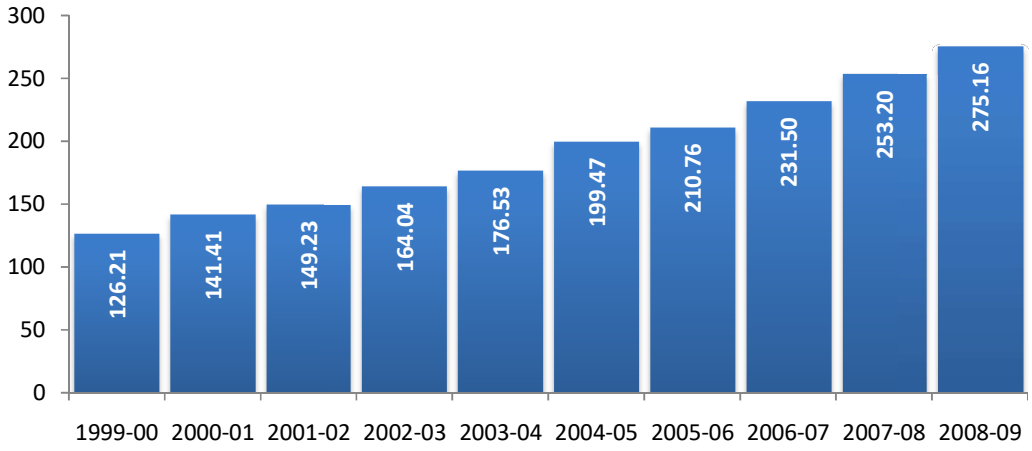


Figure 16: Trends in Gross State Domestic Product at Factor Cost (Rs.'00 crores)in Uttarakhand, at 1999-00 Prices

District-wise District Gross Domestic Product (DGDP) at constant price 1999-00 shows that there is a high concentration of output in four districts, namely Haridwar, Dehradun, Nainital and US Nagar, while in all the remaining districts, the amount of DGDP has been quite low. This clearly establishes uneven distribution of output across districts. However, all districts of the state recorded significant increase in the DGDP during the last one decade (1999-00 to 2008-09).

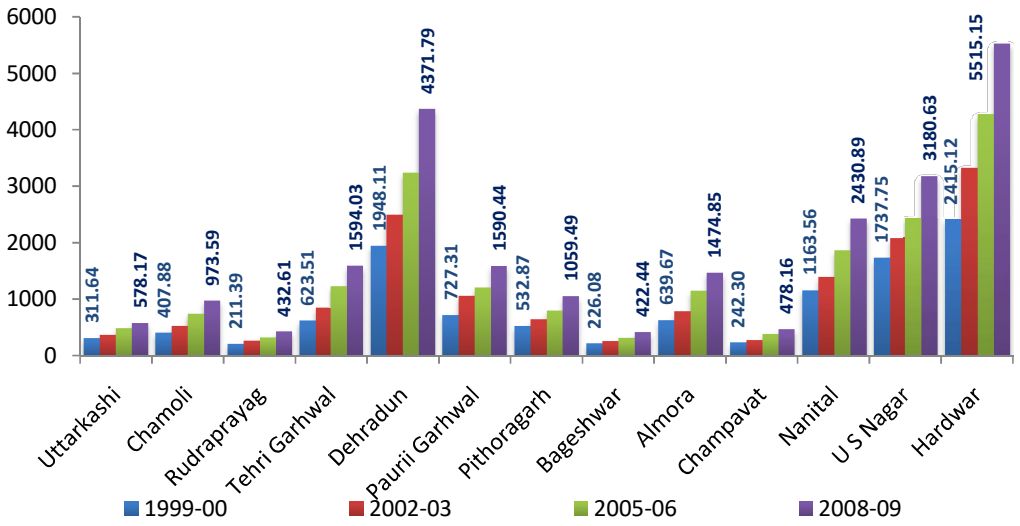


Figure 17: GDDP (Crore Rs.) across districts of Uttarakhand, at 1999-00 Prices

4.2. Per Capita Gross State Domestic Product

Figure 18 presents the trend in per capita GSDP in the State. It is significant to note that the per capita GSDP at 1999 -00 prices has increased from Rs.12,177 in 1999-00 to Rs.22,348 in 2008-09.During the last one decade, it has registered an average increase of 8.35 per annum. This shows that the state has made remarkable achievement in terms of per capita GSDP.

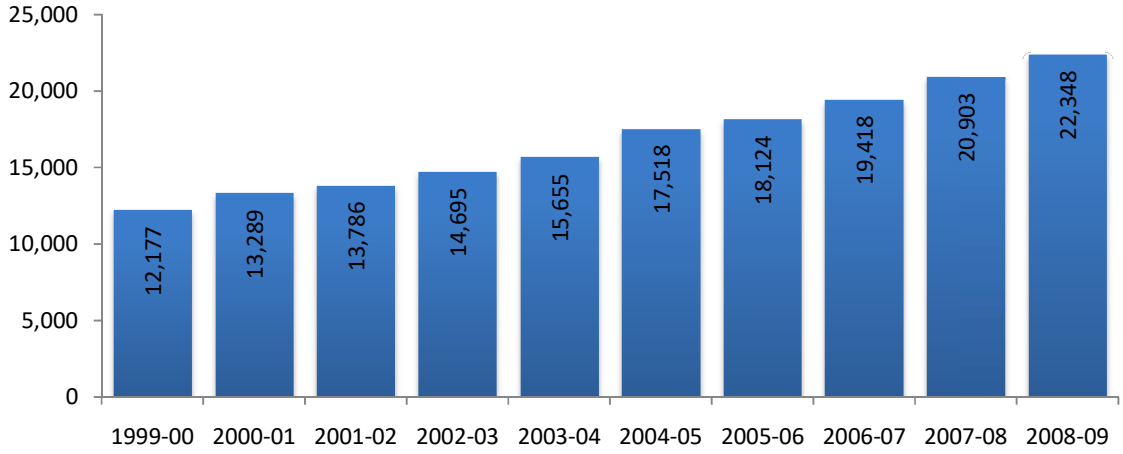


Figure 18: Per Capita GSDP (Rs.) in Uttarakhand at 1999-00 Prices

Figure 19 shows district-wise trends in the real per capita GSDP in the state. As is evident from the Figure, all districts have achieved remarkable growth in the per capita GSDP during the period 1999-00 to 2008-09. However, there has been a marked difference in the amount of per capita GSDP across districts – highest in the plains and lowest in the hills.

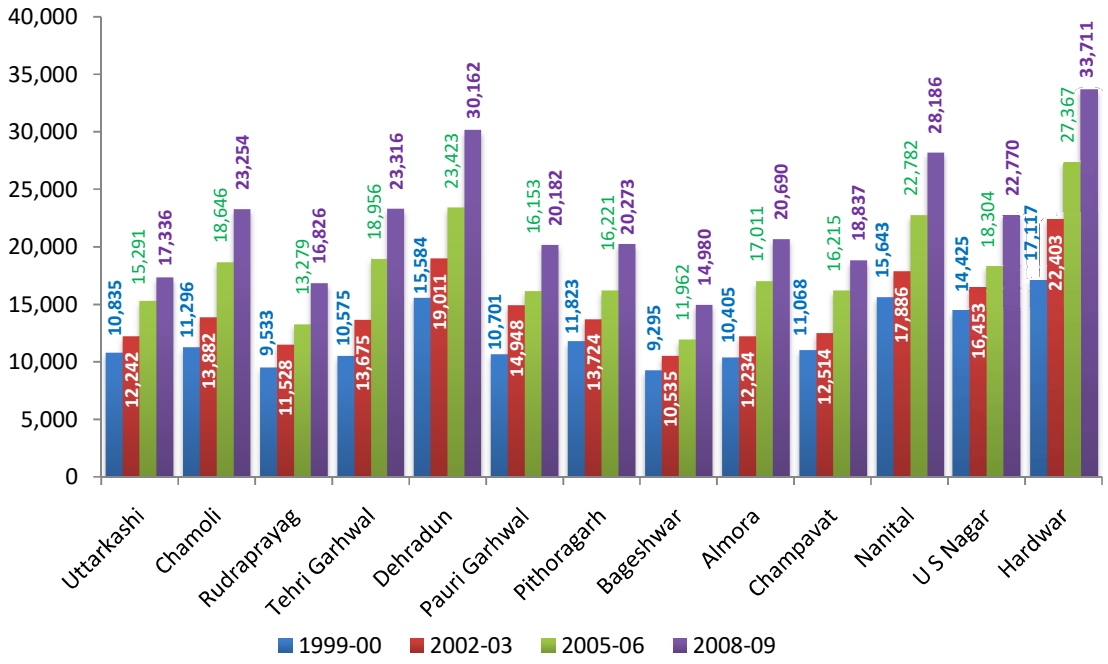


Figure 19: Per Capita GDP at constant 1999-00 Prices (in Rs.) across Districts

An analysis of trends in average per capita income (PCI) at 1999-00 prices as presented in Figure 20 shows significant increased during the last 10 years in both the plains and the hill regions, however it is much higher in the former compared to the latter throughout the period. Interestingly the rate of growth in PCI has remained higher in the hill region than the plain region.

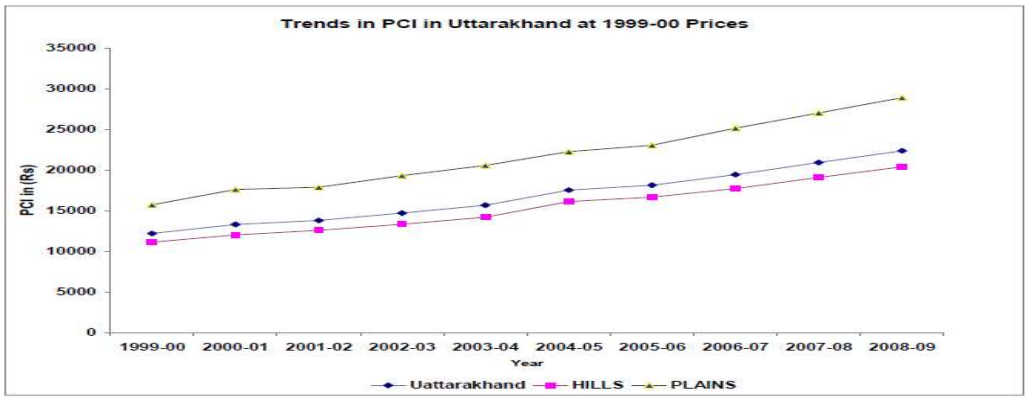


Figure 20: Trends in Per Capita Income in Uttarakhand (at 1999-00 Prices)

As far as district-wise compound annual growth rate (CAGR) in per capita income is concerned, Figure 21 shows that the growth rate varies substantially across districts. It is

noted that although PCI is higher in plain districts, its annual growth rate is higher in hill districts. Lower population growth in hill districts is one of the key reasons for this trend.

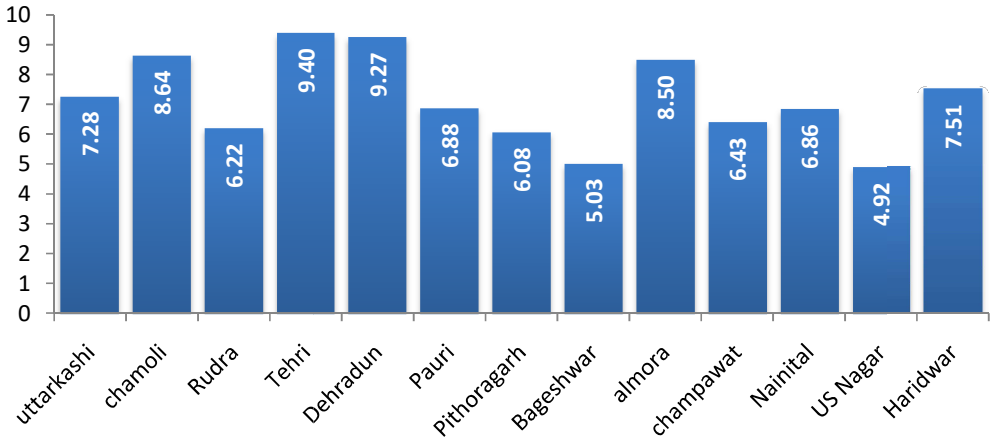


Figure 21: CAGR (%) of Per Capita Income across Districts of Uttarakhand, 1999-2009

4.3. Trends in Sectoral Composition of GSDP

Figure 22 presents trend in the sectoral composition of GSDP of Uttarakhand during 1999-2000 to 2008-09 (at 1999-00 prices). It is evident from the graph that the maximum contribution in the GSDP was from tertiary sector. A perusal of Figure 22 reveals that there has been continuous decline in the share of primary sector from 29 percent in 1999-00 to 16 percent in 2008-09. Contrary to this, share of secondary sector had significantly increased from 20 percent to 35 percent during the same period. As far as, share of tertiary sector is concerned, its share has been stable around 50 percent. This shows that during the last 10 years, secondary sector grew much faster than the other two sectors. The trends in the sectoral composition of the GSDP are not fully in line with the all-India average trends where share of tertiary sector in the GDP has been continuously rising while that of agriculture has been declining.

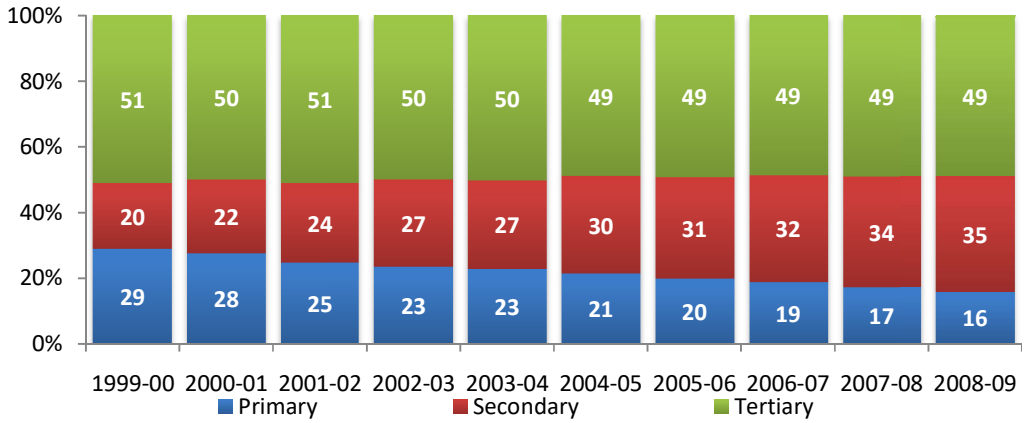


Figure 22: Sectoral Composition of GSDP (%), Uttarakhand, 1999-00 to 2008-09

Figure 23 presents the share of different districts in the GSDP under the three sectors during 1999-00 to 2008-09. As the Figure shows that in 1999-00, three plain districts, namely, Haridwar, US Nagar, and Dehradun together comprised about 48 percent of total primary sector GDP, 59 percent of total secondary sector GDP, and 56 percent of total tertiary sector GDP. After one decade, in 2008-09, the corresponding shares of these districts in total GDP (of primary, secondary and tertiary sectors) have declined marginally to 43 percent, 58 percent and 55 percent respectively. This implies that during the last decade, GDP of hill districts also achieved some growth. Consequently their share in the agricultural GDP has increased 5 percent point and in other sectors also their share has marginally improved.

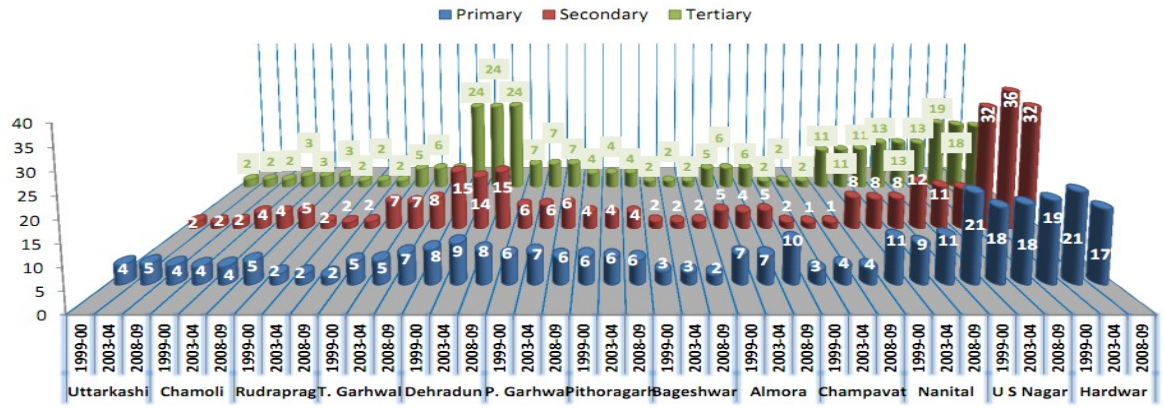


Figure 23: Sectoral Composition of GSDP (%) across Districts of Uttarakhand, 1999-2008

Figure 24 shows the district-wise sectoral composition of GSDP in the State. It is significant to note that on an average, the share of primary sector has declined during the last decade, while share of secondary and tertiary sectors has increased. However, there exists a wide variation in the sectoral distribution of GSDP across districts. During 1999-00 to 2008-09, the share of agriculture in the overall GSDP has significantly declined in all the districts of the State.

During 1999-00 to 2008-09, the share of secondary sector in the total GSDP significantly increased in all districts of the State.

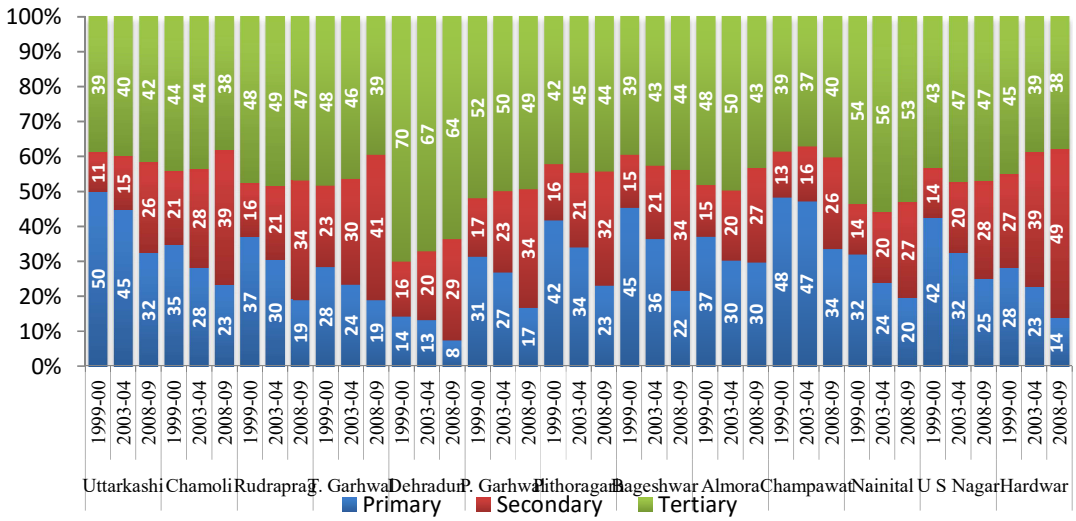


Figure 24: Sectoral Composition of GDDP (%) across Districts, 1999-00 to 2008-09

Although tertiary sector has the highest contribution to the overall GSDP of the state, its share has declined in most of the districts during the period 1999-00 to 2008-09, as is evident from the Figure-24. Deceleration in the share of tertiary sector in the State is just opposite to the national trend which indicates constant rise in the share of service sector in the overall GDP of the country. The percentage share of service sector in the overall GSDP is found highest in Dehradun district of the state. However, its share has declined from 70 percent in 1999-00 to 64 percent in 2008-09. Similarly, the share of service sector in Haridwar district has declined from 45 percent to 38 percent during the same period.

4.4. Trends in Occupational Structure

Figure 25 shows occupational distribution of main workers according to 2011 Population Census. It is evident from the Figure that more than 58 percent (farmers + agricultural workers) of main workforce directly depends on agriculture for livelihood. The proportion of such workers is much higher in the hill region (61.8 %) than the plain region (48.7%). There is a noticeable difference in the composition of workforce in the plain and hill districts of the State.

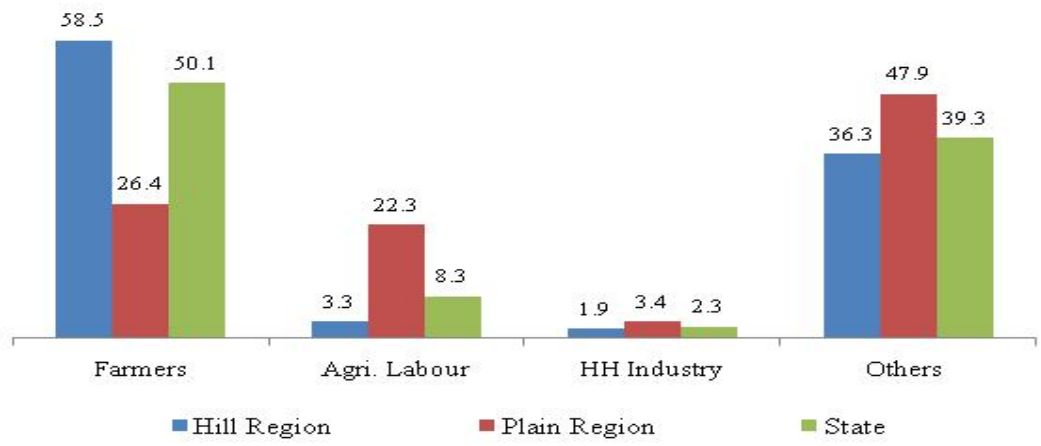


Figure 25: Proportion (%) of Main Workers by Occupational Category, Uttarakhand, 2011

It is observed that the proportion of agricultural labour is almost negligible in hill region (3.3%) while it is about 22 percent in the plain region. Contrary to this, percentage share of farmers in the total workface is much higher (58.5%) in hill region than in plain region (26.4%). This implies that due to inadequate livelihood options available to the people of the hill regions, a majority of them depends on their small size of land holdings for survival whereas in plain region, apart from developed agriculture, there are lots of other livelihood alternatives. This fact is also evident from the share of other workers in the total main workers, which is higher in plain region (47.9%) compared to the hill region (36.3%).

4.5. Rural Households below Poverty Line

District-wise percentage of rural households below poverty line (BPL) is shown in Figure 26 for two time points i.e., year 2002 and 2009. In 2002, intensity of rural poverty was found highest in Haridwar district (14.82%), followed by US Nagar (11.30%) and Tehri (9.99%). The population below poverty line was lowest in Champawat (3.24%), followed by Rudraprayag (4.06%) and Uttarkashi (4.57%). A comparison of BPL households in 2002 to that in 2009 reveals that there has not been any significant decline in the percentage of population below poverty line. In fact, in most of the districts, percentage of BPL population has marginally increased.

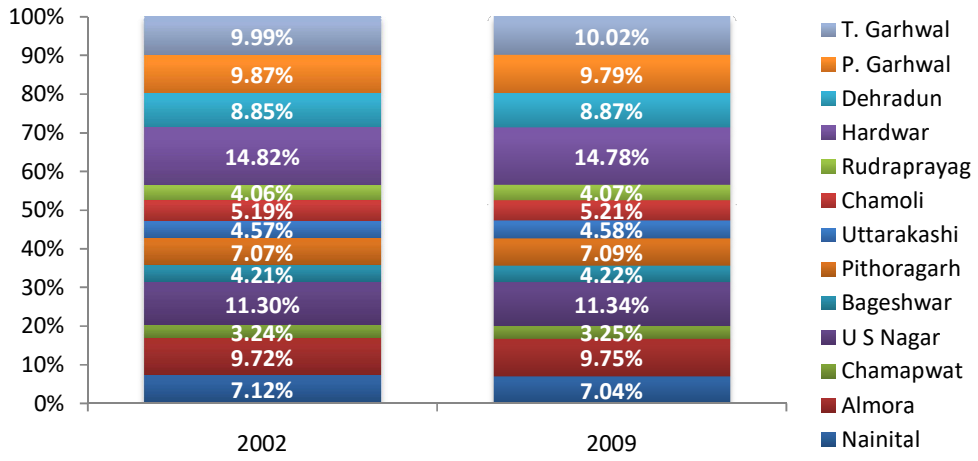


Figure 26: District-wise percentage distribution of BPL Households in Rural Uttarakhand

Table 6 shows that number of rural households below poverty line has remained almost stagnant between 2002 and 2009. Out of 13 districts, 10 districts recorded no change in the number of BPL households. Marginal decline in the number is observed only in Nainital, Pauri Garhwal, and Haridwar. The incidence of rural poverty is highest among the SC households. At the state level, 25.73 percent of poor households belonged to SC category.

Table 6: District-wise distribution of BPL Households (Rural) in 2002 and 2009

S. No.	*Uttarakhand/ Districts*	2002 (Nos.)	2009 (Nos.)		
			Total	SC	ST
1	Nainital	44,394	43,785	13,568	551
2	Almora	60,659	60,659	19,076	-
3	Chamapwat	20,198	20,198	4,523	271
4	Udham Singh Nagar	70,517	70,517	15,379	9,091
5	Bageshwar	26,238	26,238	807	2
6	Pithoragarh	44,129	44,129	14,845	2,053
7	Uttarkashi	28,485	28,485	8,998	335
8	Chamoli	32,384	32,384	8,370	664
9	Rudraprayag	25,295	25,295	6,865	12
10	Hardwar	92,430	91,927	35,355	490
11	Dehradun	55,199	55,199	11,871	10,542
12	Pauri Garhwal	61,554	60,909	14,505	331
13	Tehri Garhwal	62,308	62,308	5,910	1,334
	Total	**623,790**	**622,033**	**160,072**	**25,676**

Source: Rural Development Department, Uttarakhand

4.6. Trends and Pattern in Banking

Table 7 presents selected statistics related to commercial banks in Uttarakhand during 2003-11. The data show that the number of commercial bank offices in the State has increased substantially from 872 in 2003 to 1291 in 2011, a net increase of 48 percent during the last 9 years. Looking at the location-wise distribution of number of bank offices, it is observed that number of bank offices has increased faster in urban than in the other areas. In urban areas, the number has gone up from 140 in 2003 to 289 in 2011, a more than two-fold increase, while in rural areas, the corresponding number went up from 526 to 617 during the same period, thus recording only 1.17 times increase.

Table 7: Statistics related to Commercial and Co-operative Banks, Uttarakhand, 2003-2011

Indicators	2003	2004	2005	2006	2007	2008	2009	2010	2011
No. of Commercial Bank Offices	872	888	905	930	960	1056	1106	1213	1291
(a) Rural	526	526	523	528	527	551	570	594	617
(b) Semi-Urban	206	212	221	222	239	275	290	342	385
(c) Urban	140	150	161	180	194	230	246	277	289
(d) Metropolitan	0	0	0	0	0	0	0	0	0
No. of RRB's offices (as on June)	174	171	168	164	164	175	180	183	195
(a) Rural	156	153	149	147	146	150	152	154	161
(b) Semi-Urban	17	17	18	15	16	20	20	21	25
(c)Urban/Metropolitan	1	1	1	2	2	5	8	8	9
No. Co-operative Banks	187	195	197	200	202	203	203	219	-
Total No. of Employees in Bank	8,982	8,949	9,000	9,178	9,199	9,271	9,991	10,491	11,342
CDR (as per Utilization in %)	21.4	23.4	29.1	29.1	32.1	31.6	28.6	38.2	39.1

Source : RBI, For Co-operative banks-National Bank for Agriculture and Rural Development

In semi-urban areas, the number of bank offices has increased from 206 to 385 during the same period (1.86 times increase). Thus, although percentage share of rural areas in total bank offices is highest, it has declined during the last 9 years, whereas the percentage share of urban areas in the total bank offices has increased during the same period. The table shows that number of people employed in banks in the state has increased from 8982 in 2003 to 11342, a net increase of 26.27 percent. It is also significant to note that credit-deposit ratio in the state has also improved over the period. It went up from 21.4 percent in 2003 to 39.1 in 2011. However, it is still low when compared to several other States, including Western Uttar Pradesh.

Table 8 shows the district-wise distribution of number of bank offices in the state. Number

of offices of nationalized banks in the state has increased from 369 in 2003 to 631 in 2011, thus registering a net increase of 71 percent, whereas number of offices of RRB has increased from 174 in 2003 to 195 in 2011, a net increase of only 12 percent. District-wise distribution of bank offices reveals that the number of bank offices varies significantly across districts. The highest concentration of bank offices is found in Dehradun district, followed by Haridwar, US Nagar and Nainital. These four districts together constitute more than 75 percent of offices of nationalized banks. However, distribution of offices of RRBs seems to be more even as seen in the table.

Table 8: District-wise Distribution of the Number of Offices of Banks in Uttarakhand, 2003-2011

Uttarakhand/ District	NATIONALISED BANKS					REGIONAL RURAL BANK				
	2003	2005	2007	2009	2011	2003	2005	2007	2009	2011
State Total	369	389	431	481	631	174	169	164	180	195
1. Almora	21	21	22	23	29	20	19	19	19	21
2. Bageshwar	3	3	3	5	6	13	12	12	12	12
3. Chamoli	4	4	4	5	9	11	10	10	10	12
4. Champawat	3	3	3	7	10	4	4	4	6	6
5. Dehra Dun	118	126	138	150	197	13	12	11	18	21
6. Garhwal	26	28	32	38	48	34	34	33	34	34
7. Haridwar	74	77	90	101	117	1	1	1	6	8
8. Nainital	41	41	45	49	63	20	20	19	19	20
9. Pithoragarh	2	2	2	4	9	21	21	21	21	23
10. Rudraprayag	3	3	3	4	9	4	4	4	5	6
11. T. Garhwal	18	18	18	18	23	22	21	19	19	19
12. U. S. Nagar	48	55	63	69	99	8	8	8	8	8
13. Uttarkashi	8	8	8	8	12	3	3	3	3	5

The number of commercial bank offices is an important indicator of development of any district or region. Since concentration of population and economic activities is relatively higher in these four plain/semi-plain districts, the demand for financial services is relatively higher here. Districts located in the hill areas are thinly populated and also level of economic activity in these districts is quite low. For example, in 2011, Bageshwar, Chamoli, Pithoragarh, and Rudraprayag districts of the state consisted of less than 10 bank offices. Financial inclusion of rural households in the remote villages of hill districts is a major challenge for the government. There is a need to evolve a suitable banking model for providing easy access to banking services to the already excluded regions. Mobile banking or Business Correspondence Model may be a cost-effective solution for the financial inclusion.

5. Social and Health Components

5.1 Education

5.1.1 Literacy Level

Literacy plays an important role in the development of family and the younger generation. Educated and empowered men and women are fundamental characteristics of a developed society. Figure 27 compares literacy rate in Uttarakhand with Uttar Pradesh and India during 1951-2011. The Figure shows that literacy rate in Uttarakhand has been higher than the parent state Uttar Pradesh ad it is also higher than the national average since 1981. Between 1991 and 2011, the rate went up from 57.75 percent to 79.63 percent, a net increase of about 22 percent point.

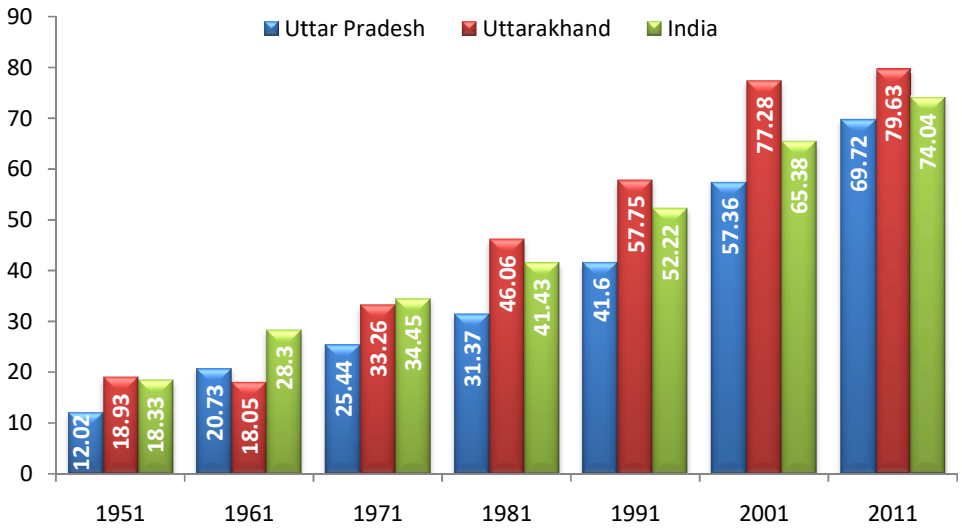


Figure 27: Literacy Rate (%), Uttarakhand, Uttar Pradesh and India, 1951-2011

District-wise literacy rates for the last two Population Censuses are shown in Figure-28. It is observed that in all the districts, literacy rate has increased in 2011 over the preceding census. Interestingly, literacy rates are higher in hill districts than the plain districts and among the latter, US Nagar which otherwise has shown impressive development in other sectors scores the lowest.

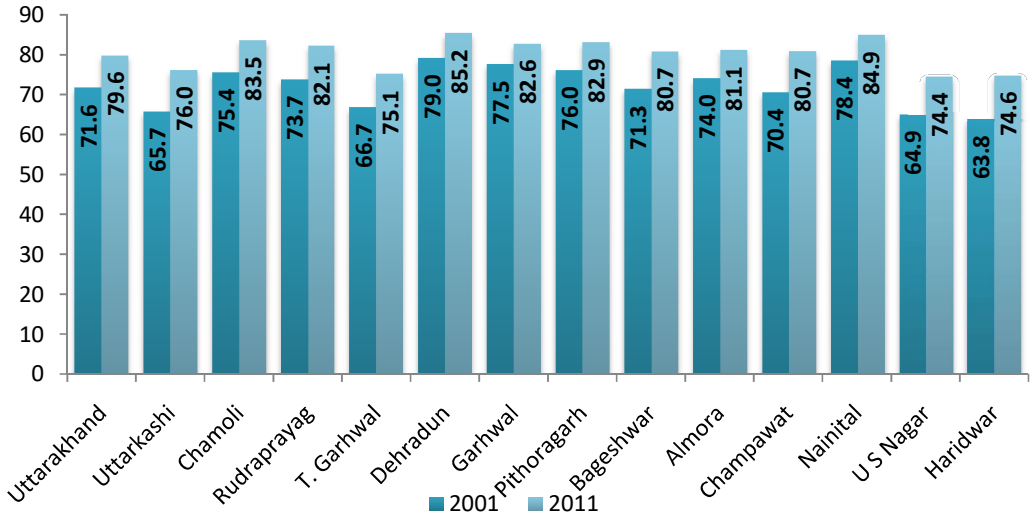


Figure 28: Literacy (Person) Rate (%) across Districts of Uttarakhand, 2001-2011

As per Census 2011, literacy rate among male ranges from 82.3 percent in Haridwar to 95 in Rudraprayag. Figure 29 shows that male literacy is higher in hill districts than the plain districts. The figure further shows that among the males, it has increased in 2011 over 2001.

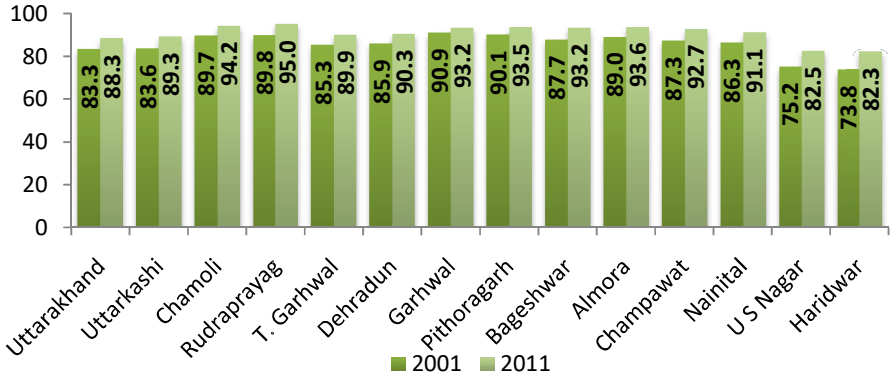


Figure 29: Literacy (Male) Rate (%) across Districts of Uttarakhand,2001-2011

Figure 30 shows that literacy rate among females is much lower than that among males in both the Censuses. At the State level, in 2011, as against 70.7 percent literacy rate among females, the corresponding rate among males is 88.5.

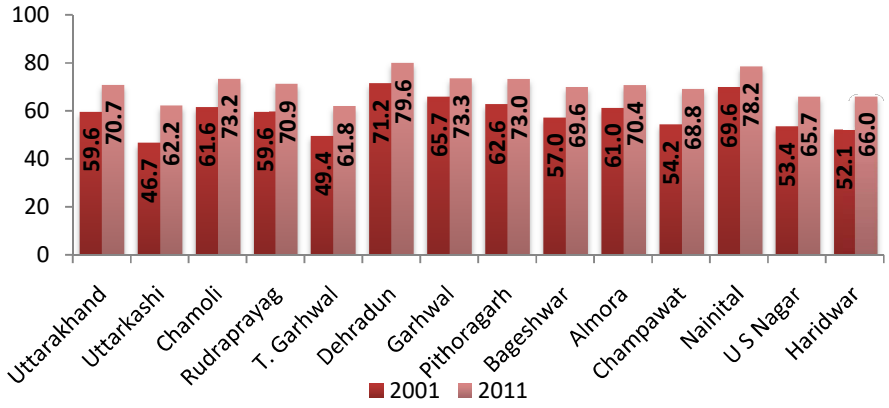


Figure 30: Literacy (Female) Rate (%) across Districts of Uttarakhand, 2001-2011

5.1.2. Number of Educational Institutions

As per the latest Statistical Diary of Government of Uttarakhand, the state has 15,644 Junior Basic Schools with 36,394 teachers and 11,55,639 students. The teacher-student ratio comes out to be 73.87. Girls constituted 46 percent of the total number of students enrolled at the Junior Basic Schools. At the Senior Basic level, the state has 4296 schools with number of 12,317 teachers and 5,36,216 students with teacher-student ratio at 43.54. The percentage share of girls in the total enrollment was 49.33. There were 2,439 higher secondary schools with 31,710 teachers and 6,89,739 students. The teacher-student ratio was 21.75. Thus it is intriguing that forhigher level of education the teacher-ratio is declining which indicates severe shortage of faculty. In the field of higher education, the state has 106 degree colleges (total 62,290 students enrolled), 12 universities, 04 deemed universities (apart from one IIT, NIT, and IIM). In the field of medical education, two medical colleges have been established.

Table 9 provides information on district-wise number of government schools at primary, upper primary and secondary levels in the State.

As far as number of private primary schools is concerned, It is noted from Table 9 and 10 that on an average, hill districts have relatively higher number of schools under government ownership while the plain districts have higher number of schools under private ownership.

Table 9: District-wise Government Schools, Uttarakhan

Total Schools - Government										
Uttarakhand/ Districts	Primary		Primary with Upper primary		Primary with Upper Primary sec/higher sec.		Upper Primary Only		Upper Primary with sec./higher sec.	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
Uttarakhand	**12,627**	**12,687**	**27**	**35**	**38**	**38**	**3,003**	**3,034**	**1,649**	**1,533**
Almora	1,426	1,450	1	3	2	3	212	194	215	216
Bageshwar	603	611	-	-	1	1	115	117	73	70
Chamoli	988	1,007	9	9	4	5	263	271	127	97
Champawat	516	515	-	-	2	1	132	130	67	68
Dehradun	929	964	4	3	10	7	271	276	105	97
Pauri	1,658	1,677	2	2	5	4	315	381	264	205
Hardwar	751	694	2	2	-	1	167	146	44	45
Nainital	958	972	3	4	3	3	252	252	159	153
Pithoragarh	1,193	1,190	5	6	6	6	298	294	144	147
Rudraprayag	569	571	-	-	1	1	151	164	76	62
Tehri	1,475	1,473	-	-	1	1	337	334	220	217
U S Nagar	790	802	-	4	2	4	224	226	93	89
Uttarkashi	771	761	1	2	1	1	266	249	62	67

Source: DISE

Table 10: District-wise Private Schools, Uttarakhand (2009-10)

Total Schools - Private										
Uttarakhand/	Primary		Primary with Upper primary		Primary with Upper Primary sec/ higher sec.		Upper Primary Only		Upper Primary with sec./higher sec.	
Districts	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
Uttarakhand	**2,767**	**2,657**	**811**	**802**	**316**	**280**	**730**	**702**	**400**	**359**
Almora	195	181	45	44	17	18	37	36	49	49
Bageshwar	73	78	12	10	4	4	12	13	21	20
Chamoli	110	112	44	50	4	2	28	31	14	9
Champawat	79	75	23	26	2	1	18	15	7	7
Dehradun	440	437	236	217	119	114	129	122	40	40
Pauri	161	152	72	76	24	20	32	31	76	61
Hardwar	411	376	135	144	52	47	120	98	44	45
Nainital	183	191	67	42	35	29	48	65	37	27
Pithoragarh	201	195	34	42	9	9	53	50	17	16
Rudraprayag	124	120	20	18	1	2	39	40	13	12
Tehri	244	236	38	42	6	4	53	52	27	23
U S Nagar	422	399	51	60	37	24	147	137	46	41
Uttarkashi	124	105	34	31	6	6	14	12	9	9

Source: DISE

5.1.3. Enrolments

Gross and net enrollments at primary and secondary level are shown in Table 11. At the State level, gross enrollment ratio (GER) at primary level in 2009-10 was 106.18, while net enrollment ratio (NER) was 86.52. At the upper primary level, GER and NER were 91.18 and 61.86 respectively.

Table 11: District-wise Gross and Net Enrolment Ratio, Uttarakhand, 2008

District Name	Gross Enrolment Ratio (GER)						Net Enrolment Ratio (NER)					
	Primary			Upper Primary			Primary			Upper Primary		
	2008-09	2009-10	2010-11	2008-09	2009-10	2010-11	2008-09	2009-10	2010-11	2008-09	2009-10	2010-11
Uttarkashi	129.34	122.49	120.78	102.05	107.08	107.97	106.25	99.17	99.51	72.86	77.13	78.28
Chamoli	108.57	103.62	100.91	105.19	104.67	103.87	92.69	84.85	82.9	76.96	75.39	76.52
Rudraprayag	120.9	117.25	112.22	106.31	109.44	108.59	93.95	90.26	85.97	98.1	88.45	93.85
T. Garhwal	120.17	113.73	105.31	103.69	103.21	101.05	95.73	91.49	85.03	72.23	73.46	72.94
Dehradun	93.46	92.96	100.19	71.53	74.08	86.96	80.58	73.57	79.26	57.63	50.24	59.91
Pauri Garhwal	91.84	90.54	89.44	91.2	95.1	95.84	78.05	75.39	74.49	67.64	69.36	75.28
Pithoragarh	105.56	100.17	97.16	103.8	106.4	103.15	86.75	81.92	78.72	74.16	76.06	75.58
Bageshwar	102.08	101.75	97.04	100.09	104.08	102.06	87.44	84.14	81.26	71.88	74.92	73.61
Almora	99.72	96.07	93.9	101.76	102.88	103.09	81.62	77.56	76.81	71.65	72.53	73.19
Champawat	131.63	122.15	121.17	113.76	114.47	116.28	110.7	98.41	98.14	78.23	80.88	85.13
Nainital	91.41	94.23	93.35	82.44	92.78	92.95	77.29	78.73	77.76	58.99	67.85	69.68
U S Nagar	130.55	129.83	132.69	91.82	99.44	105.29	109.16	109.05	108.82	65.11	70.88	77.33
Hardwar	116.31	108.56	132.48	65.62	66.13	79.97	96.44	87.34	103.33	47.53	47.64	57.9
Uttarakhand	107.48	109.37	106.18	78.80	87.78	91.18	90.37	91.21	86.52	58.26	64.34	65.26

Source: DISE

Figure 31 shows the district-wise percentage of children in age group 6-17 years attending school in rural and urban areas of the state. From the available data it can be concluded that percentage of children in school in the age group 6-17 years is quite high in rural and urban areas both. Further, no significant difference between rural and urban areas is observed. However, difference is observed across districts. Two districts, namely Haridwar and US Nagar located in plain region have relatively less percentage of children in school when compared to the hill districts of the state.

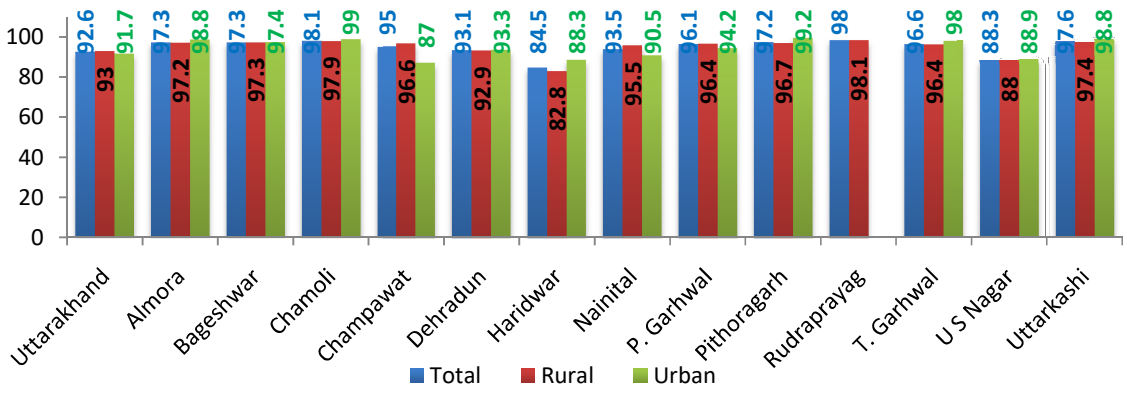


Figure 31: **District-wise Percentage of Children Attending School (Age 6-17 yrs) in 2010-11**

5.2. Drinking Water and Sanitation

A pure drinking water facility and adequate management of sanitation facility are two prominent indicators of a healthy state. District Level Household Survey (DLHS)-3[12] conducted during 2007-08 provides comprehensive information on the household infrastructure and facilities apart from other reproductive and child health indicators across all districts in India. Lack of access to safe drinking water with adequate quantity to households creates ill- health and high mortality rates due to diarrhea, cholera, typhoid and other water-borne diseases, especially among vulnerable groups like women and children.

Figure 32 presents the percentage of households having access to electricity, toilet and improved sources of drinking water in Uttarakhand. The Figure shows that percentage of households having access to improved sources of water has increased from 50.28 in 2002-04 to 58.3 in 2007-08 in rural areas and from 84 to 98.3 in urban areas. Thus, there has been an improvement in the access to safe drinking water in both rural and urban areas in the state. However, proportion of such households has been much higher in urban areas than in rural areas.

Access to electricity has also increased in the state between 2002-04 and 2007-08. In rural areas, proportion of households having access to electricity has increased from 57.19 percent in 2002-04 to 80.1 percent in 2007-08. For urban areas, it has increased from 93.5 percent to 97.6 percent during the same period. Similarly, urban areas have better access to toilet facility than the rural areas. The Figure shows that as against 90.2 percent households in urban areas having access to toilet facilities during 2002-04, the corresponding percentage of households in rural areas was only 35.89. Although access to toilet facility has improved in both rural and urban areas of the state in 2007-08, about 56 percent households in rural Uttarakhand did not have access to toilet facilities in 2007-08. From the data shown is Figure 32, it can be concluded that access of rural households to three basic needs—electricity, toilet and safe drinking water has been much lower than that compared

to urban households.

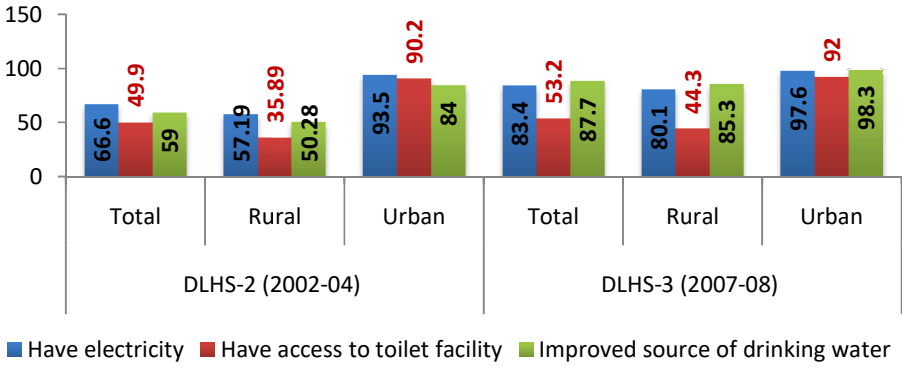


Figure 32: Proportion of Households having electricity, access to toilet facility and improved source of drinking water, Uttarakhand

Figure 33 shows the district-wise access of rural and urban households to improved sources of drinking water. A perusal of the Figure reveals that in almost all the districts, the percentage of households having access to improved source of water is much higher in urban areas than rural areas. Access to safe drinking water in rural areas of the plains is found higher as a result of adequate availability of groundwater.. However, access to hand pump water cannot guarantee that the water would be free from any contamination. In urban areas, almost all households in the plains have access to improved source of drinking water. In other districts also, the proportion of urban households having access to improved source of drinking water is quite high.

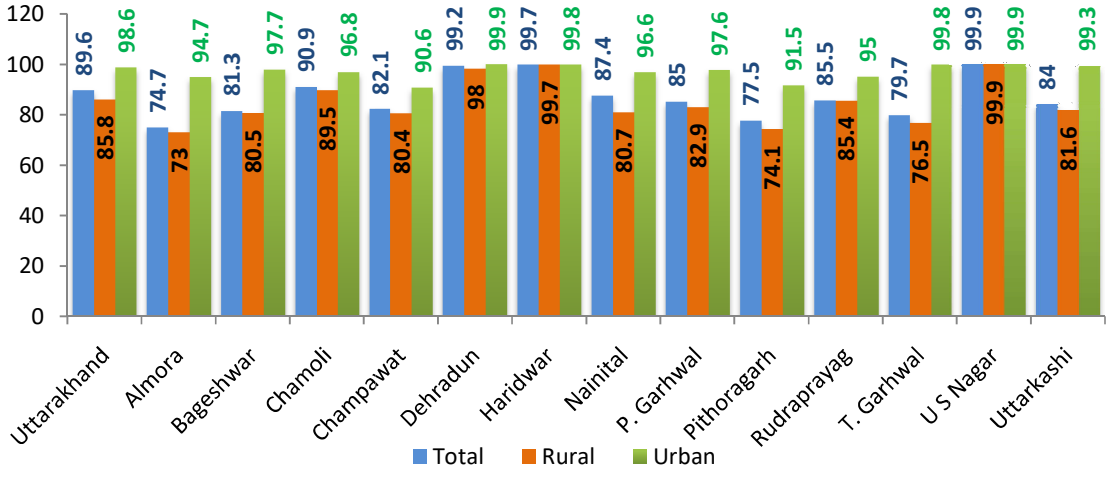


Figure 33: Households having Improved Source of Drinking Water (%), Uttarakhand, 2010

Figure 34 shows percentage of households treating water at point of use and brings out huge rural-urban divide. Lesser percentage of urban households in the plains resort to treatment of drinking water before its use because of dependence on groundwater which is generally perceived to be of better quality as compared to those in the hills which mostly depend on surface water (e.g., streams/rivers/lakes/ponds) and is generally not perceived to be safe.

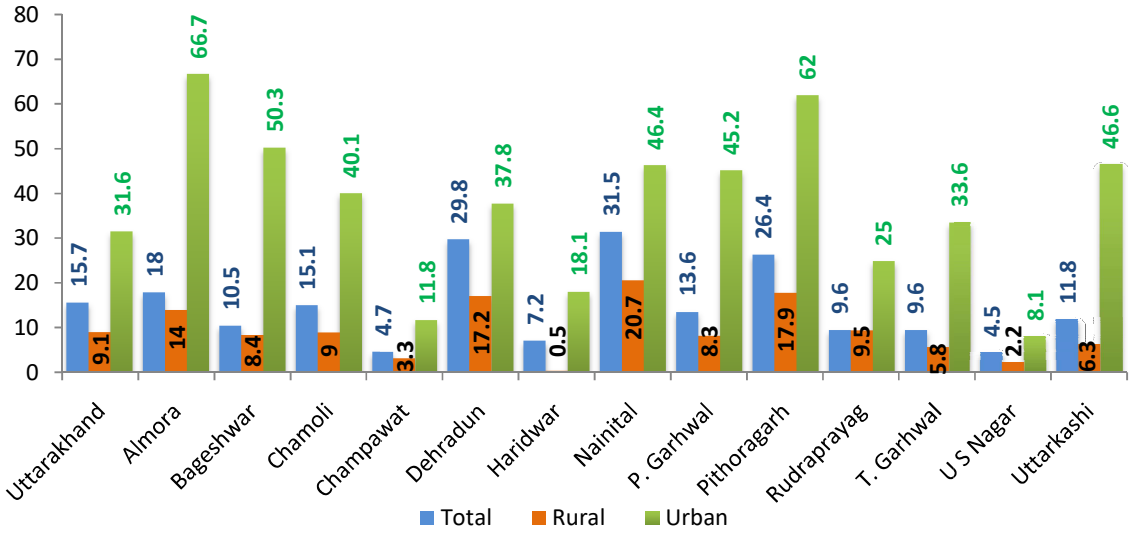


Figure 34: Households treating water to make it Safer for Drinking (%), Uttarakhand, 2010

Figure 35 shows the proportion of households having access to toilet facility across districts of Uttarakhand during 2010-11. Households having access to toilet facility here refers to the improved source of sanitary toilet. A perusal of the Figure reveals that about 46 to 90 percent households of the state have access to toilet facilities. Urban households have better access to toilet facilities than their rural counterparts. Most of the toilets in rural areas are connected to septic tanks or leach pits as there is no sewerage system. Even in most towns of the state, septic tank system is used for sanitary toilets. This has severe implications to drinking water facilities which may be contaminated due to seepage from septic tanks into the groundwater in plains and streams/river water downstream in the hill areas. Unless significant efforts at technology development and adaptation take place, water-borne diseases such as diarrhea may not be cured.

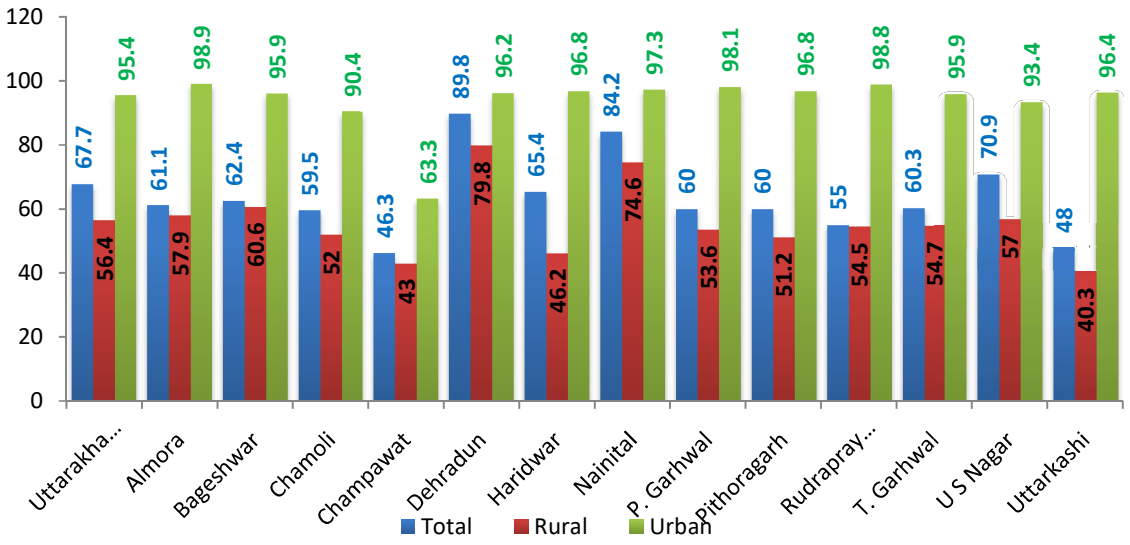


Figure 34: Households having Access to Toilet Facility (%),Uttarakhand, 2010

5.3. Health Status

The state has an extensive network of public health institutions comprising District / Base / Combined Hospitals (36), Women & Child Welfare Centers (2), Women & Child Welfare Sub-centers (1765), additional Primary Health Centers (250), Community Health Centers (55), Allopathic Dispensaries (322), Rural Female Hospitals (39), Homeopathic Dispensaries (107), Ayurvedic Hospitals (540), Unani Hospitals, Tuberculosis Hospitals (18). To cater to specific diseases, there are 23 Blood Banks, 3 Leprosy Hospitals, 9 Urban Leprosy Centers and 7 Urban Family Welfare Centers. There is one private Medical College and 2 Government Ayurvedic Medical Colleges. However, there exists a wide disparity in the public healthcare infrastructure across districts and regions.

Table 12 presents district-wise crude death rate (CDR) in Uttarakhand during 2010-11. Average CDR is higher among males than females in both rural and urban areas. At the state level, as against 7.9 CDR among males, the corresponding rate among female was only 5.4. Further, CDR is observed higher in rural areas among both males and females. This indicates that urban households have relative better access to healthcare facilities. On an average, females have lower CDR in both rural and urban areas in all the districts. Further, urban areas have relatively lower CDR than the rural areas.

Table 13 shows district-wise IMR in the State in 2010-11. At the state level, IMR was 43 per 1000 live births. IMR was higher in rural areas (46) as compared to urban areas (33), and among females (44) as compared to males (42).

Table 12: Crude Death Rate (CDR), Uttarakhand, 2010-11

	Total			Rural			Urban		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Uttarakhand	**6.6**	**7.9**	**5.4**	**7**	**8.5**	**5.5**	**5.7**	**6.5**	**4.9**
Almora	6.1	8.1	4.3	6.2	8.3	4.3	4.3	5.2	3.3
Bageshwar	7.2	9.3	5.3	7.3	9.3	5.4	7	9.1	4.8
Chamoli	5.3	6.6	4	5.7	7.2	4.3	3.2	4	2.3
Champawat	5.4	7.1	3.7	5.5	7.4	3.6	4.8	5.5	4
Dehradun	6.9	7.8	5.9	7.4	8.7	6.1	6.5	7.2	5.8
Haridwar	7.9	8.6	7.1	8.3	8.9	7.7	7.1	8	6.1
Nainital	5.5	6.4	4.6	6	7	4.9	4.9	5.5	4.2
Pauri Garhwal	8.4	10.4	6.6	8.8	11	6.9	6	7	4.9
Pithoragarh	6	7.7	4.4	6.6	8.5	4.9	3.1	4.1	2
Rudraprayag	6	8.2	4.1	6	8.2	4.2	-	-	-
Tehri Garhwal	9.3	11.9	7.2	9.7	12.7	7.3	6.9	7.4	6.3
Udham Singh Nagar	5.4	6.2	4.4	5.7	6.6	4.6	4.8	5.5	4
Uttarkashi	4.6	5.5	3.7	4.7	5.7	3.8	3.8	4.7	2.8

Table 13: Infant Mortality Rate (IMR), Uttarakhand, 2010-11

	Total			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Uttarakhand	**43**	**42**	**44**	**46**	**46**	**47**	**33**	**32**	**33**
Almora	20	20	20	20	19	21	-	-	-
Bageshwar	31	31	31	32	33	32	-	-	-
Chamoli	27	27	26	30	31	29	-	-	-
Champawat	37	39	34	31	35	26	-	-	-
Dehradun	37	36	37	45	46	44	29	28	30
Haridwar	72	68	75	81	75	89	47	52	41
Nainital	31	33	29	27	30	23	37	37	36
Pauri Garhwal	43	42	43	44	44	45	32	32	32
Pithoragarh	20	18	24	23	21	27	-	-	-
Rudraprayag	19	19	19	19	20	19	-	-	-
Tehri Garhwal	61	61	61	64	65	62	40	29	53
Udham Singh Nagar	37	37	37	44	47	41	25	20	31
Uttarkashi	38	38	38	41	41	40	-	-	-

Table 14 presents district-wise under-5 mortality rate (U5MR) in the State. U5MR was recorded as 53 per 1000 live births. At the state level, there is not much difference in the magnitude of U5MR among males and females. However, there is a substantial difference between rural and urban areas. As against 58 U5MR in rural areas, the corresponding rate in the urban areas was only 39. IMR seems to be highly correlated with U5MR. On an average, U5MR was lower in hill districts than the plain districts, indicating that health outcomes are better in hills than the plain districts of the State.

Table 14: Under Five Mortality Rate (U5MR), Uttarakhand, 2010-11

	Total			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Uttarakhand	**53**	**53**	**54**	**58**	**58**	**59**	**39**	**39**	**40**
Almora	25	26	25	26	25	26	-	-	-
Bageshwar	39	39	38	40	41	39	-	-	-
Chamoli	30	31	30	34	35	33	-	-	-
Champawat	44	44	43	34	37	31	-	-	-
Dehradun	45	45	45	57	58	56	35	34	36
Haridwar	94	89	99	111	103	121	54	58	49
Nainital	38	40	36	36	39	33	41	41	40
P. Garhwal	51	50	52	53	52	54	36	34	39
Pithoragarh	24	22	26	27	25	29	-	-	-
Rudraprayag	26	28	25	26	28	25	-	-	-
T. Garhwal	76	76	76	79	81	78	48	39	59
U S Nagar	44	45	43	49	51	47	35	34	36
Uttarkashi	47	45	48	50	49	51	-	-	-

Source: Annual Health Survey Uttarakhand, 2010-11

Figure 35 shows district-wise two kinds of mortality rates, namely neo-natal mortality rate and post neo-natal mortality rate separately for rural and urban areas. Overall, neo-natal and post neo-natal mortality rates are higher in rural areas than the urban areas. Further it is noted that on an average, both neo-natal and post neo-natal mortality rates are higher in plain than hill districts. Moreover, within the hills, districts located in Kumaon region have lower rates than those located in the Garhwal region.

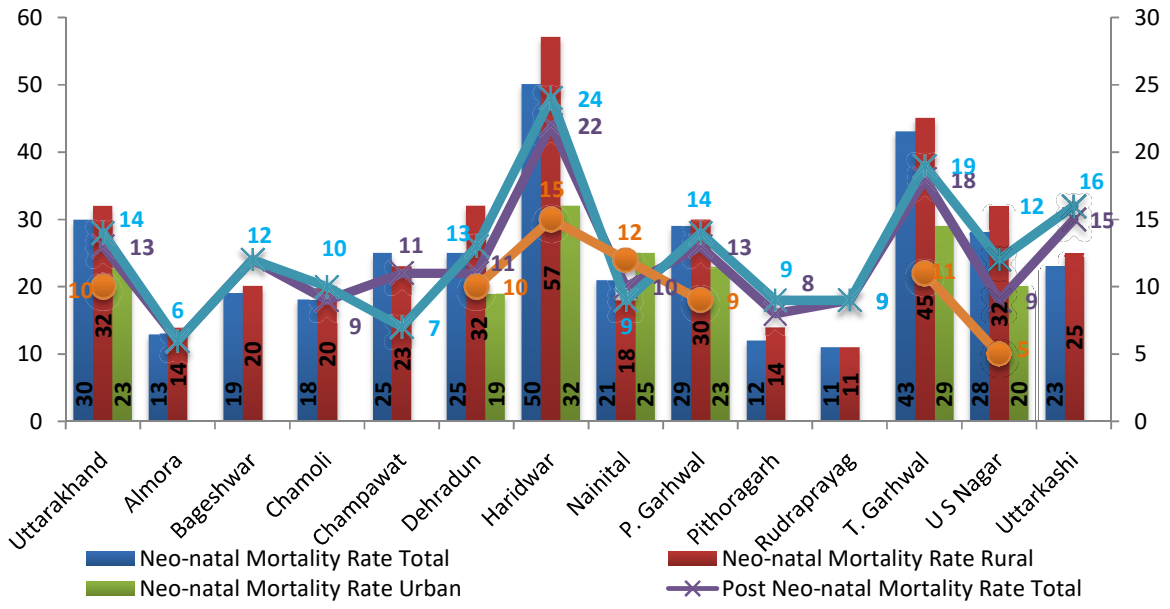


Figure 35: Neo-natal and Post-natal Mortality Rate, Uttarakhand, 2010-11

Figure 36 presents information on children suffering from diarrhea - one of the major water-borne diseases. At the State level, 9.6 percent children suffered from diarrhea. The percentage of such children was higher in rural areas (10.6%) than urban areas (6.8%). It can be concluded from the above analysis that percentage of children suffering from diarrhea is lower in Kumaon region than the Garhwal Region. Further, Uttarkashi being exception, the percentage of children suffering from diarrhea is higher in plain region than the hill region. The higher prevalence of diarrhea in plain districts of the state may possibly be attributed to poor quality of groundwater, an important source of drinking water in these districts.

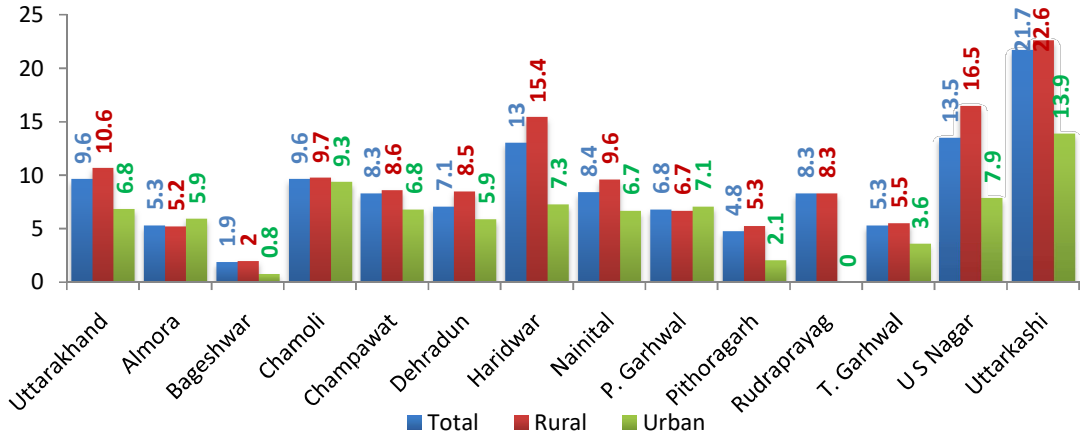


Figure 36: Children suffering from Diarrhea (%), Uttarakhand, 2010-11

Figure 37 presents district-wise information on children suffering from Acute Respiratory Infection (ARI) in the state. Districts in the plains recorded higher proportion of children suffering from ARI (8.3 to 12.4%) than in the hills.

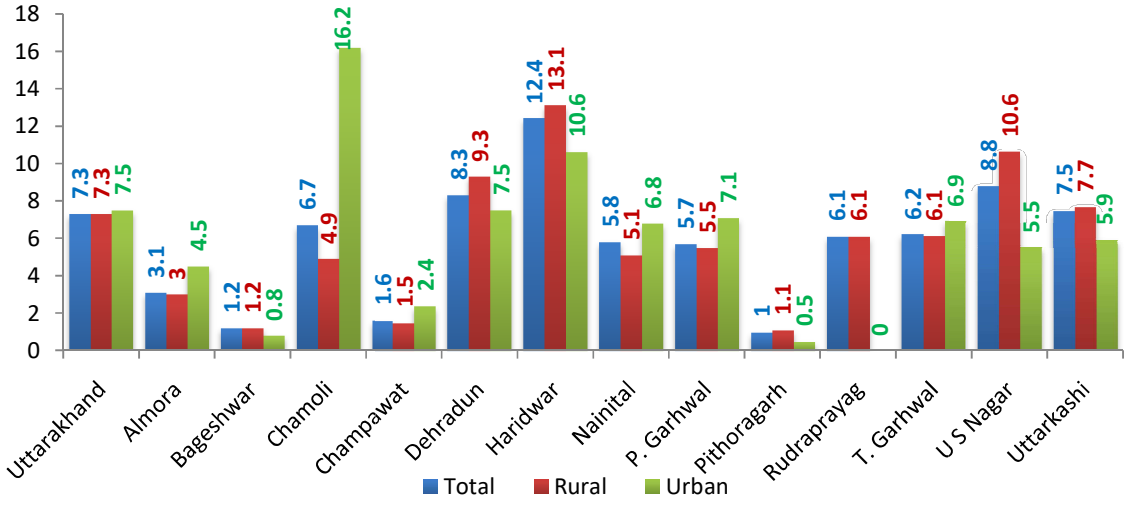


Figure 37: Children suffering from Acute Respiratory Infection (%), 2010-11

District-wise proportion of children suffering from fever is shown in Figure 38. At the state level, about 20% children suffered from fever. At the state level, there was not much difference between rural and urban areas in the percentage of children suffering from fever. Haridwar has the highest proportion of children suffering from fever among all the districts of the State. The data presented in Figure 38 again testifies that on an average, health status of children was much better in hill distrits than the plain districts. Further, Kumoan region has relatively better health ststus than the Garhwal region. Apparently Hariwar district has poorest health status among all the districts.

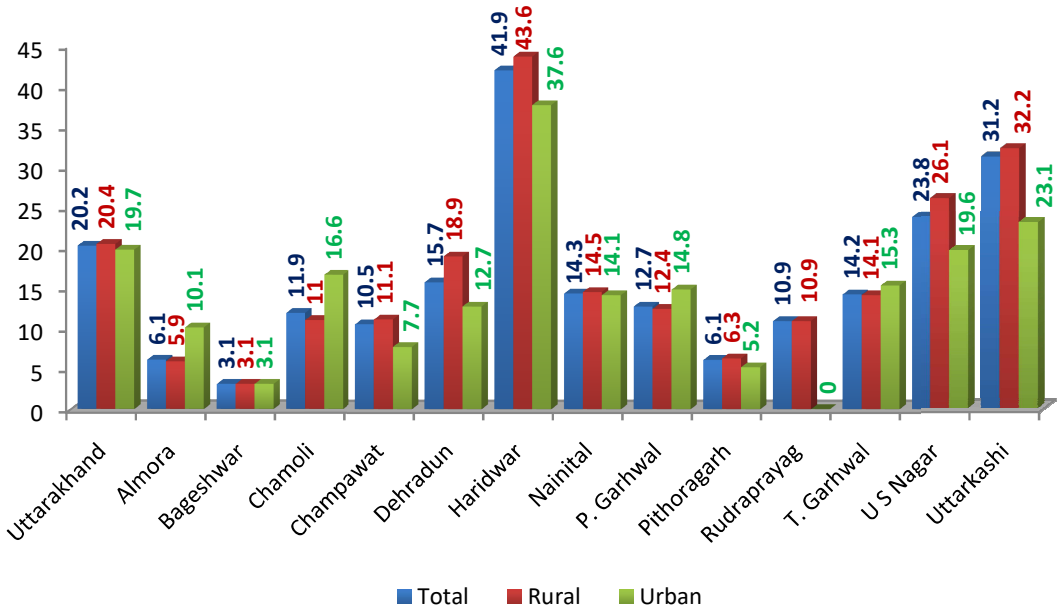


Figure 38: Children suffering from Fever (%), Uttarakhand, 2010-11

6. Population Projections

District-wise population projections have been made based on the past trends assuming the policy parameters as constant. CAGRs are calculated using the population data for the period 1991-2011. Starting with the district-wise population as per the estimates of the three consecutive censuses, i.e., 1991, 2001, and 2011 and assuming linearity in the trend, the projections have been made for the years 2025 and 2050. Table 15 shows district-wise CAGRs and Table 16 provides population projections for the year 2025 and 2050. On an average, CAGR has been much higher in urban than rural population in all the districts of the state. Annual growth rate in population during the last 20 years again testifies that the population pressure in the state is mostly in four plain/semi-plain districts.

Based on the estimated CAGRs in population, district-wise linear population projections have been made for 2025 and 2050. In 2025, the state population would be 13.26 million, with 39 percent share of urban population (Table 16).

Table 15 : District-wise CAGR in Population in Uttarakhand (1991-2011)

State / Regions	Total	Rural	Urban
Uttarakhand	**1.77**	**1.08**	**3.56**
Almora	-0.14	-0.29	1.35
Bageshwar	0.41	0.37	1.54
Chamoli	0.55	0.38	1.54
Champawat	1.45	1.48	1.28
Dehradun	2.85	2.19	3.41
Haridwar	2.90	1.82	5.01
Nainital	2.27	1.68	3.29
Pauri Garhwal	-0.15	-0.56	2.29
Pithoragarh	0.50	0.34	1.52
Rudraprayag	0.41	0.10	13.76
Tehri Garhwal	0.19	0.03	1.59
Udham Singh Nagar	2.92	2.46	3.82
Uttarkashi	1.12	1.16	0.55

Table 16: District-wise Population projections in Uttarakhand for the year 2025 and 2050

State/districts	Census 2011 (Million)			Projected Population (Million) 2025			2050		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttarakhand	**10.12**	**7.03**	**3.09**	**13.26**	**8.31**	**5.16**	**22.86**	**11.79**	**14.63**
Almora	0.62	0.56	0.06	0.61	0.54	0.08	0.59	0.50	0.11
Bageshwar	0.26	0.25	0.01	0.28	0.26	0.01	0.30	0.29	0.02
Chamoli	0.39	0.33	0.06	0.42	0.35	0.07	0.48	0.39	0.11
Champawat	0.26	0.22	0.04	0.32	0.27	0.05	0.45	0.39	0.06
Dehradun	1.70	0.75	0.95	2.52	1.01	1.52	5.09	1.74	3.52
Haridwar	1.93	1.20	0.73	2.88	1.54	1.44	5.89	2.43	4.91
Nainital	0.96	0.58	0.37	1.31	0.74	0.59	2.29	1.12	1.31
Pauri Garhwal	0.69	0.57	0.11	0.67	0.53	0.15	0.65	0.46	0.27
Pithoragarh	0.49	0.42	0.07	0.52	0.44	0.09	0.59	0.48	0.13
Rudraprayag	0.24	0.23	0.01	0.25	0.23	0.06	0.28	0.24	1.51
Tehri Garhwal	0.62	0.55	0.07	0.63	0.55	0.09	0.66	0.55	0.13
Udham Singh Nagar	1.65	1.06	0.59	2.47	1.49	0.99	5.07	2.74	2.53
Uttarkashi	0.33	0.31	0.02	0.39	0.36	0.03	0.51	0.48	0.03

As Table 16 shows urban population will exceed the rural population in state by 2050. The share of urban population in the total population would be 64 percent, more than double that of 2011. However, figures of projected population (both rural and urban) vary significantly across districts. In 2050, four districts, viz., Haridwar, US Nagar, Dehradun and

Nainital together would constitute 80.23 percent of total population, 83.87 percent urban population and 68.11 percent of rural population of the state. On the other hand, remaining 9 hill districts together would have only about 20 percent total population, 14 percent urban population and 32 percent rural population of the state.

7. Water Demand and Supply Projections

The issue of demand for and supply of water for various purposes along Ganges and its extensive network of canals and major tributaries does have a great relevance in terms of current as well as future needs, given the fact that quantitative supply and water quality problems are escalating and could severely impair the economic development, environment, and wellbeing of all forms of life existing in the basin. It is, therefore, important that the water resources are managed in such a way that water needs for various purposes, including the environmental one are met without compromising the future needs. The first step in this regard is projection of future needs of water in different sectors and effective management of water supply of and demand in short and long runs. While the supply side management involves technical and other interventions for the scientific development and growth of water resources, the demand side management accounts for the socio-economic-cultural dimensions for the appropriate allocation of water among various competing uses.

Demand for water is made for the following purposes: domestic and municipal usages; irrigation, industry usages (including power generation) and the tertiary sector; for cultural festivals and religious rites; for the evacuation of effluents (sanitation, removing industrial wastes etc.); navigation and recreation; and environmental flow/ecologically needs. The demands from all these usages are increasing at much faster rate and compete with each other due to rapid population growth, urbanization and industrialization, especially in the plain districts of the state. Major demand for water comes from agricultural sector. In Uttarakhand, out of total 3,38,493 hectares of net irrigated area, share of canals was 25% and that of tube-wells/wells 67% and rest 8% of other sources. (Uttarakhand at a Glance, 2011-12). A projection for the demand for water for different states by GOI for the years 2025 and 2050 reveals that the combined demand for water in UP and Uttaranchal is highest (137 BMC in 2025 and 171.6 BMC in 2050) among all the states (Indiastat.com).

The sources of water supply comprise: (i) Ganges and its tributaries; (ii) ground water (with uneven spatial distribution); (iii) return flows from irrigation, water supply, and industries; and (iv) harvested rain water. Of all the above, while reliable estimates are available for (i) and (ii), there are practical difficulties in estimating (iii) and (iv). Planning Commission has prepared projected estimates calculating the ratio of the total return flows to total availability of water (including returns) at 26% for 2050. Before proceeding ahead, it may be relevant to point out that one of the basic characteristics of the water supply in India, from any source, is that water for all uses does not reflect even the cost of recovery and is, in a

way, highly subsidized or free essentially because of the prevalence of a 'Right-Based Approach'. This has resulted in indiscriminate use of water, and consequently low water use efficiency. For instance, as per CWC the average water use efficiency of Irrigation Projects is only of the order of 25-35%. The Planning Commission has also reported 30-40 per cent losses in the case of urban water supply (http://planningcommission.nic.in/plans/mta/midterm/english-pdf/chapter-06.pdf. Ground water, which meets most of current demand for water, stands over-exploited in both rural and urban areas, besides, widely reported contamination/pollution hazards due to percolation of industrial effluents, municipal solid wastes, pesticides and herbicides (Bhargava and Dutta 2010).

The projections in regard of the demand for and supply of water for various purposes/sources, have been made by the Planning Commission and given the sound methodology adopted for doing the same, these projections can be taken as fairly reliable. These projections are made on the basis of the figures adopted by National Commission on Integrated Water Resources Development, India (1999) regarding the per person water requirement for the rural and urban consumers. For rural areas, 70 lpcd and 150 lpcd have been recommended for the year 2025 and 2050, while for urban areas the estimates are based on a rate of 165 lpcd for 2025 and 220 lpcd for 2050. Based on these per capita domestic water consumption norms in rural and urban areas, the projected district-wise domestic water demand is presented in Table 17.

Table 17 shows that by 2050, annual water requirement in rural and urban areas of the state would be 0.646 and 1.175 BMC, respectively. Out of total 1.821 BMC water needs in the domestic sector of the state, share of four plain/semi-plain districts is projected to be 78.30 percent. Further, these districts would be expected to share 68 percent rural and 84 percent urban domestic water requirement of the state. This implies that future water needs in the domestic sector would be much higher in urban areas of plain districts of the state.

Table 18 presents projected demand and supply of water in the state for 2025 and 2050.. For 2025, the water requirement for various purposes would be about 5.202 BMC/Yr and supply would be 7.02 BMC/Yr, thus there would still be some surplus water by 2025 if all the assumptions of the projections hold true. The projections, nevertheless, do not account for minimum required water flow in the river. Table 18 shows that net non-agricultural demand for water is projected to substantially increase from 1.862 BMC/Yr in 2025 to 3.89 BMC/Yr in 2050, a record increase of 109 percent.

Table 17: Projected Domestic Demand of Water, Uttarakhand (BCM/Yr)

Uttarakhand/ Districts	2025			2050		
	Total	Rural	Urban	Total	Rural	Urban
Uttarakhand	0.523	0.212	0.311	1.821	0.646	1.175

Almora	0.018	0.014	0.005	0.036	0.027	0.008
Bageshwar	0.007	0.007	0.001	0.017	0.016	0.001
Chamoli	0.013	0.009	0.004	0.030	0.021	0.009
Champawat	0.010	0.007	0.003	0.027	0.021	0.005
Dehradun	0.117	0.026	0.092	0.378	0.095	0.282
Haridwar	0.126	0.039	0.087	0.527	0.133	0.394
Nainital	0.054	0.019	0.035	0.167	0.061	0.106
Pauri Garhwal	0.023	0.014	0.009	0.047	0.025	0.022
Pithoragarh	0.016	0.011	0.005	0.036	0.026	0.010
Rudraprayag	0.010	0.006	0.004	0.135	0.013	0.122
Tehri Garhwal	0.019	0.014	0.005	0.041	0.030	0.010
Udham Singh Nagar	0.098	0.038	0.060	0.354	0.150	0.204
Uttarkashi	0.011	0.009	0.002	0.029	0.026	0.002

Although, water requirement in agriculture has not been projected for 2050, if we assume that demand for water in agriculture would also increase at the rate same as in non-agricultural sector, then net water requirement for irrigation would be more than 6.5 BMC/Yr by 2050. This implies that there would be more pressure on water resources if sincere efforts are not made to make efficient use of water in various sectors, especially in agriculture which currently comprises more than 80 percent of total water requirement of the state.

Changing cropping pattern from high water intensive to low water intensive crops, shifting from conventional farming to organic farming and use of modern irrigation technology and practices may substantially reduce the irrigation water requirement in agriculture. Water pricing policy should be framed in such a manner that the water users in different sectors, including agriculture, should get incentive to save water so that more water may be made available for ecological and environmental needs of the basin.

Table 18: Projected Demand for and Supply of Water for Uttarakhand (BCM/Yr) for 2025 and 2050

Demand in Withdrawal Terms	2025	2050
Domestic Water Demand*	0.523	1.821
Power Demand **(Based on UPSEB Projections)**	1.50	2.83
Industrial Demand (withdrawal)	0.20	0.30
Return at 50% for domestic and industrial use (-)	0.361	1.06
Net in consumptive terms	1.862	3.890
Net Agricultural Demand	3.34	-
Total demand	**5.202**	**-**
WATER SUPPLY		**-**
Annual Replenishable Groundwater (Gross Recharge in Dehradun, Haridwar, Nainital and US Nagar districts)	2.24	-
Surface Water	4.76	-
Total Availability	7.02	-
Surplus	1.818	-

* As per the projections made in Table 17.

Source: Water Resources: Management and Development, Uttarakhand Development Report, Planning Commission, Govt. of India, and our own projections based on Table 17.

8. Summary of Findings and Actionable Points

An understanding of growth and composition of population, sectoral composition of economic activities, health, water & sanitation, livelihood pattern and their possible impact on quality and quantity of water in the river basin is quite relevant. Therefore, management of the basin is required to be viewed as a part of the broader environment and in relation to socio-economic demands and potentials, acknowledging the political and cultural context. It is in this background that this report analyses the demographic and socio-economic factors in the Upper Ganga Basin (Uttarakhand).

8.1 Summary of Findings

- Population of the state has sharply increased by 44% during 1991 to 2011. Three districts in the plains constitute 52 percent of total population of the state, whereas remaining 10 hill districts account for only 48 percent of the state's population. This implies that population pressure is in the plain districts.

- On an average, population grew faster in the districts of plain region than the districts of hill region. Further, plain region has relatively higher proportion of urban population than hill region.

- Migration of people from the hilly region seems to be the main reason for the deceleration of population growth rates. Migration is attributed to lack of basic infrastructure and employment opportunities

- There exists a significant variation in CDR, IMR and U5MR between rural and urban areas - much higher in the former and lower in the latter.

- There has been significant increase in the density of population in the plain districts of the state, while its increase in most of the hill districts is quite low or negligible

- While overall sex ratio in hills is much higher than that in plains; however no significant difference between hill and plains regions is observed in case of sex ratio at birth and at 0-4 years. This clearly shows that the huge difference in the overall sex ratio between hill and plain districts is mainly due to migration of male population, especially from rural areas of hill districts to other places.

- Overall dependency ratio in the State is estimated to be 69.8 percent. The ratio is found highest in rural areas (75.5%) than urban areas (57.1%). The implication is that the government should investment more in rural development activities so that the working population may generate adequate income to support relatively higher proportion of dependent population (both children and aged people).

- During the last one decade, the state has made remarkable progress in terms of GSDP. Economic activity is highly concentrated in the plains – i.e., in four districts of Haridwar, Dehradun, Nainital and US Nagar.

- All districts have achieved remarkable growth in per capita GSDP during the period 1999-00 to 2008-09.

- There has been continuous decline in the share of primary sector in the GSDP from 29 percent in 1999-00 to 16 percent in 2008-09. Contrary to this, share of secondary sector had significantly increased from 20 percent to 35 percent during the same period. As far as share of tertiary sector is concerned, it is rather stable around 50%.

- More than 58 percent (farmers + agricultural labour) of main workforce directly depends on agriculture for livelihood. The proportion of such workers is much higher in the hill region (61.8 %) than the plain region (48.7%). Further, the proportion of agricultural labour is almost negligible in hill region (3.3%) while it is about 22 percent in the plain region. Contrary to this, percentage share of farmers in the total workface is much higher (58.5%) in hill region than in plain region (26.4%). This implies that due to inadequate livelihood options available to the people of the hill regions, a majority of them depends on their

small size of land holdings for the survival whereas in plain region, apart from developed agriculture, there are lots of other livelihood alternatives. This fact is also evident from the share of other workers in the total main workers, which is higher in plain region (47.9%) compared to the hill region (36.3%).

- Between 2002 to 2009 there has not been any significant decline in the BPL households. Incidence of rural poverty is observed highest among the SC households.

- Number of bank offices has increased faster in urban than in the other areas. The highest concentration of bank offices is found in district in the plain region.

- Literacy rates are higher in the hill districts than the plain districts. Moreover, hill districts have relatively higher number of schools under government ownership while the plain districts have higher number of schools under private ownership.

- Access to three basic needs—electricity, toilet and safe drinking water has been much lower in rural areas than urban areas. However, there has been some improvement in these amenities between 2002-04 and 2007-08 in both rural and urban areas.

- As against 90.2 percent households in urban areas having access to toilet facilities during 2002-04, the corresponding percentage of households in rural areas was only 35.89. Although access to toilet facility has improved in both rural and urban areas in 2007-08, about 56 percent households in rural areas did not have access to toilet facilities.
- There is high dependence on septic tanks in both rural and urban areas. With high chances of seepage of sewage, there is associated risk of groundwater contamination.

- Access to drinking water is high in the plains because of easy availability of ground water. However, access to hand pump water does guarantee safety from contamination**.**

- CDR is observed higher in rural areas than in urban areas among both males and females. This indicates that urban households have relative better access to healthcare facilities. On an average, females have lower CDR in both rural and urban areas in all the districts.

- U5MR in urban areas is lower than in rural areas. Likewise, it is lower in the hill region as compared to the plains. This indicates that health outcomes are better in hills than the plain districts of the State.

- Percentage of children suffering from diarrhea is lower in Kumaon region than the Garhwal Region. Further the percentage of children suffering from diarrhea is higher in plain region than the hill region. Moreover, higher percentage of children from rural areas suffered from diarrhea. The higher prevalence of diarrhea in plain districts of the state may possibly be

attributed to the poor quality of groundwater, an important source of drinking water in these districts.

- Urban population in the plain region is projected to grow faster than that in hill districts. These developments may have serious implications for the demand for ground and surface water, supply of which is already under heavy stress.

- Water demand and supply projections for the State indicate that there would be more pressure on the water resources if sincere efforts are not made to make efficient use of water in various sectors, especially in agriculture which currently comprises more than 80 percent of total water requirements. Water pricing policy is required to be framed in such a manner that the water users in different sectors, including agriculture, should get incentive to save the water so that more water may be made available for the ecological and environmental needs of the basin.

8.2 Actionable Points

Based on the key findings of the study, the following actionable points are suggested:

- There is high concentration of population in four districts of the state, namely Haridwar, Dehradun, US Nagar and Nainital. These districts together constituted 61.57 percent of total population and 85.27 percent of total urban population of the state. High population pressure and rising economic activities in these plain/semi-plain districts of the Upper Ganga basin put more pressure on land, water, and other environmental resources and increased the demand for basic amenities, including water and sanitation and consequently would pollute soil, groundwater and rivers and also affect the health of plants, animals and human lives. It is, therefore, necessary that in order to maintain continuous and unpolluted water flow in the Ganga River, a two-fold strategy should be adopted. First, an appropriate institutional framework and incentive mechanism should be put in place to make an efficient use of the basin water for various purposes (such as introduction of water credit system). Second, substantial investment should be made in developing the proper municipal and industrial effluent disposal system. It may be relevant to note that during the last one decade of statehood, the share of secondary sector in the GSDP has significantly increased due to fast growth of industry and construction sector which has critical implication for degradation of river water due to industrial effluents and stone and sand mining.

- There is a need to regulate water use for different purposes which would be possible only through a wide social mobilization and effective involvement of various stakeholders. Water use literacy need to be increased among the citizens through participation of NGOs, print and electronic media and local self government institutions. Training and capacity building programmes should be initiated for both rural and urban panchayats so that these institutions may effectively perform their entrusted functions,

including water, sanitation and waste disposal related works. It is suggested that a model perspective plan in a few towns and villages may be prepared with the involvement of professional experts from academic institutions such as IITs and active involvement of local communities, including the elected representatives of local bodies and concerned government officials. Further, action research may also be conducted in some towns/villages, where the model perspective plan is prepared so that constant monitoring of implementation of plan may be made and problems be identified and constant support be provided to local community. After getting experience from such initiatives, successful planning model can be replicated in other towns and villages of the basin.

- Given the problem of open defecation and poor sanitation infrastructure, priority, should be given to create adequate public awareness about health and sanitation and appropriate incentives be provided to the rural households for the construction of toilets. Given the risk of contamination from poorly built septic tanks, sincere efforts are to be made for technology development and adaptation for sanitary toilets and proper sewage drainage system.

- The study testifies that on an average, health status of people was better in the hill region than the plain region which may be attributed to, among others, the difference in quality of drinking water. Therefore, there is a need to increase investment in creating infrastructure for treating sewage water in the densely populated plain region of the state.

- The study also finds that prevalence of water borne diseases such as diarrhea is higher in plain districts, which may be attributed to groundwater pollution.

- The government should investment more in rural development activities so that the working population may generate adequate income to support relatively higher proportion of dependent population. Further, as there is relatively higher percentage share of farmers in the total workface in hill region due to inadequate livelihood options available to them in non-farm activities, there is need to promote rural non-farm sector to provide gainful employment to the farm households who possess tiny land holdings.

- The number of commercial bank branches is an important indicator of development of any district or region. Since concentration of population and economic activities is relatively higher in the plains the demand for financial services is relatively higher there. Financial inclusion of rural households in the remote villages of hill districts is a major challenge for the government. There is a need to evolve a suitable banking model for providing easy access to banking services to the already excluded regions. Mobile banking or Business Correspondence Model may be a cost-effective solution for the financial inclusion.

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Demographic and Socio- Economic Analysis

in Middle Ganga Basin (Uttar Pradesh)

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology

IIT Bombay | **IIT Delhi** | **IIT Guwahati** | **IIT Kanpur** | **IIT Kharagpur** | **IIT Madras** | **IIT Roorkee**

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Frame Work for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. A list of persons who have contributed directly and names of those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction

Water is vital for all living organisms and major ecosystems, as well as for human health, food production, and economic development. Population growth and distribution have been intimately linked to the availability of freshwater. The 20th century has witnessed unprecedented rises in human population. Consequently, human demands for water, for domestic, industrial and agricultural purposes are also increasing rapidly.

The Ganga Basin constitutes 26 percent of the country's land mass and supports about 43 percent of population (448.3 million as per 2001 census). Livelihoods of a large number of people directly or indirectly depend on the resources of the river Ganga. In the backdrop of a very intense and perennial interrelationship between the river Ganga and its population base, it is important to dissect the components of population living in Ganga basin, their patterns of growth, composition, concentration, level of knowledge, economic activities, health constraints, etc. in order to prepare a holistic Gang River Basin Management Plan (GRBMP).

There are many links between population growth and environmental degradation, in part, because an ever-increasing number of people depend on a fixed natural resource base for their livelihood. However, it would be too simplistic to suggest that the classical Malthusian view be followed with its implied solution of simply controlling the number of people.

Demographic influences are one of many factors that affect water resource management and increase pressure on the water resource base. The relationship between human population and water resources is viewed as a two-way process, i.e. , instead of regarding population growth as the only cause of water shortages, water availability will also be considered as a possible push or pull factor in explaining migratory change and other socio-demographic outcomes[1].

For the effective and sustainable management of the basin, an understanding of growth and composition of population, sectoral composition of workforce, change in land and water use patterns, settlement patterns, livelihood patterns and their possible impact on the river water resources, inter alia, is imperative. Management of the basin is required to be viewed as a part of the broader environment and in relation to socio-economic demands and potentials, acknowledging the political and cultural context, as water is not only an economic resource but also a socio-cultural and environmental resource. Keeping these aspects in view, this report concentrates on the pattern of demographic and socio-economic status of people in the basin area[1]* and its implications for the river basin management. A comprehensive report based on the demographic and socio-economic status of population in the basin area is divided into four parts as per the location of the river Ganga and the administrative setup. These are namely, Upper Ganga Basin comprising Uttarakhand, Middle Ganga Basin comprising Uttar Pradesh, Lower Ganga

[1] *The Ganga river basin area (as the term used in the report) is limited to four states i.e. Uttarakhand, Uttar Pradesh, Bihar, and West Bengal for the study purpose, as most of the activities related to the river Ganga are performed widely in these states.

Basin comprising part A Bihar), and (B. West Bengal). This part of the report discuses the Pattern of Demographic and Socio-economic Status of People in the Middle Ganga Basin (Uttar Pradesh).

Figures and facts documented and analyzed in the present report are based on secondary data drawn from various sources, which include Uttar Pradesh Govt. website (http://www.up.gov.in) as well as Statistical Diaries and Statistical Abstracts published by the State Planning Institute, Uttar Pradesh. Census of India has been the important source for population-based data. The Census data have widely been used in this report including the recent (2011 Census) one. For some economic indicators, data from the Department of Economics and Statistics, Government of Uttar Pradesh and official website of the Reserve Bank of India have been obtained. The data from the SRS (Sample Registration System) Bulletin and Reports as well as the recently concluded Reproductive and Child Health Survey (DLHS- RCH-3)[6], 2007-08 have been used for getting a few important health indicators for the State. Specific methodology used for the analysis of the data is described in the corresponding sections of the report.

2. Middle Ganga Basin: State of Uttar Pradesh

In this report the analysis of the Middle Ganga Basin, is largely based on the statistical data compiled by the State of Uttar Pradesh. With a population of around 200 million (199,581,477 as per Census 2011), it is India's most populous state, as well as the world's most populous sub-national entity. Were it a nation in its own right, Uttar Pradesh would be the world's fifth most populous country ahead of Brazil, a country thirty-five times larger in territorial area. With an area of 236,286sq. kms., lying between latitude 24° to 31°N and longitude 77° to 84° E, Uttar Pradesh covers a large part of the highly fertile and densely populated upper and middle Gangetic plains. It shares part of the international border with Nepal to the north along with the Indian State of Uttarakhand, Himachal Pradesh to the north-west, Haryana, Delhi and Rajasthan on the west, Madhya Pradesh on the south, Chhattisgarh and Jharkhand on the south-east and Bihar on the east[2]. In sheer magnitude it is half of the area of France, three times of Portugal, four times of Ireland, seven times of Switzerland, ten times of Belgium and a little bigger than England[3]. Uttar Pradesh has more than 31 larger and smaller rivers among them holy Ganga, Yamuna, Sarayu and Ghaghara are larger and of very much religious importance.

The state of Uttar Pradesh consists of 75 districts, which are grouped into eighteen divisions. According to the latest data released by the Government of India (http://censusindia.gov.), there are 7 cities in the state having population more than 1 million, while the number of cities with more than half-a-million population stands at 16[4]. The State has 312 tehsils, 820 development blocks, 8,135 Nyaya Panchayats, 51,976 Gram Panchayats and 97,941 inhabited villages[5].

The report captures a comprehensive picture of the district-wise and state level demographic, socio-economic and health indicators. For the documentation and analysis, only 70 districts of Uttar Pradesh are discussed, since the statistics for the five newly constructed districts was difficult to obtain. However, these 70 districts comprise the whole area of the state. For better illustration of the information, these 70 districts are condensed in 5 major regions. These are namely, Northern Upper Ganga Plains (comprising 10 districts of northern Uttar Pradesh),

Southern Upper Ganga Plains (consisting of 17 districts), Central Region (embracing 9 districts including the capital of the state (Lucknow), Southern Region (basically the Bundelkhand comprising 7 districts), and the Eastern Region (enveloping 27 districts of the state). Figure 1 depicts the location of Uttar Pradesh in the Ganga Basin, and all five regions discussed above.

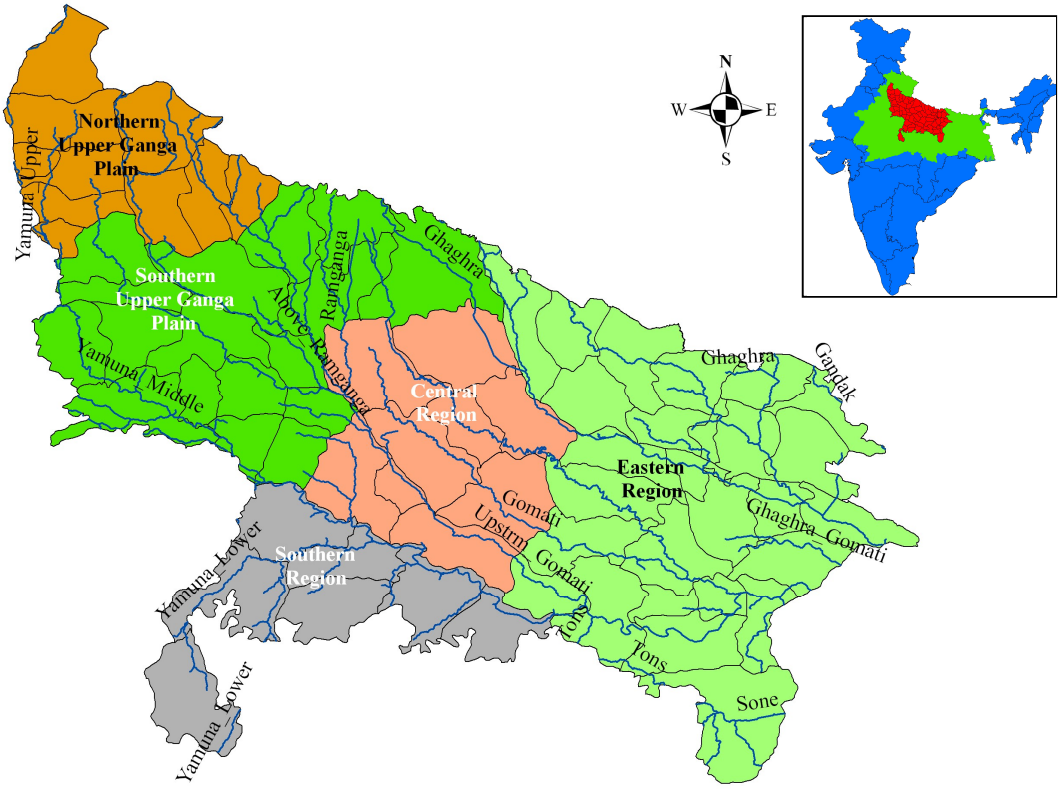


Figure 1: Location of Uttar Pradesh (with regions) in the GangaBasin and in India

3. Demographic Characteristics

3.1. Trends in Population Growth

Uttar Pradesh continues to be the most populous state in the country with almost 200 million people living here. The state holds about one-sixth or 16.5 percent population of the nation as per Census 2011. The growth in the absolute population of Uttar Pradesh (in millions) from 1901-2011 is shown in Figure 2. The undivided Uttar Pradesh represents the area of the state before bifurcation of Uttarakhand. The state added about 14.6 million people during 1901-1951, which also includes the decade (1911-21) of historical low in Indian population. Post-independence, since 1951, the proportionate addition in population rose multifold in successive decades. There was a net addition of 47.7 million persons during 1951-1981. Figure 2 suggests that the state population sharply increased during 1991-2011. The Population of Uttar Pradesh enumerated during Census 2011 was 199,581,477 persons which corresponds to a compounded annual growth rate of 1.85% over the Census 2001 population of 166,197,921.

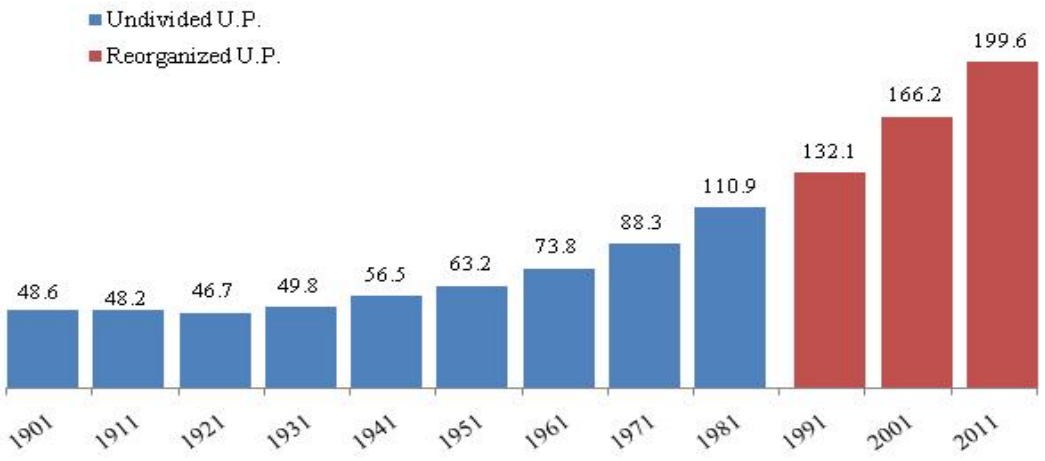


Figure 2: Trends in Absolute Population (in Million), Uttar Pradesh,1901- 2011

Before bifurcation, during the initial decades of the Twentieth century, the state has also experienced a negative growth in population (during the decades 1901-11 and 1911-21). Consequently, the growth has been constantly progressive through decades with an exceptional high during the decade 1931-41 compared to the previous decadal growth (Figure 3). After reaching the highest decadal growth rate of almost 26 percent during 1991-01, the state's population growth rate declined sharply by 5.76 percentage point during the decade 2001-11.

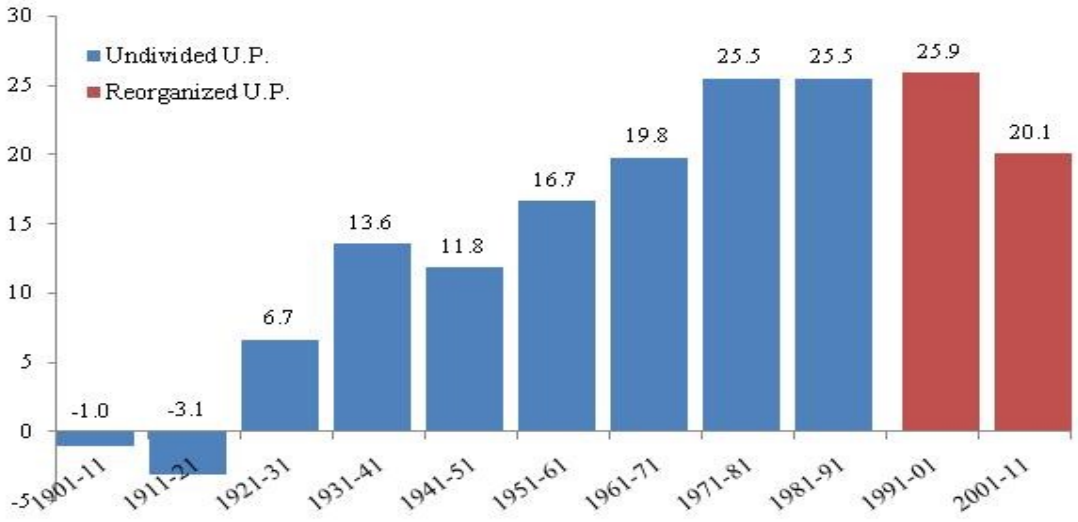


Figure 3: Trends in Population Decadal Growth Rate (%), Uttar Pradesh, 1901-11 to 2001-11

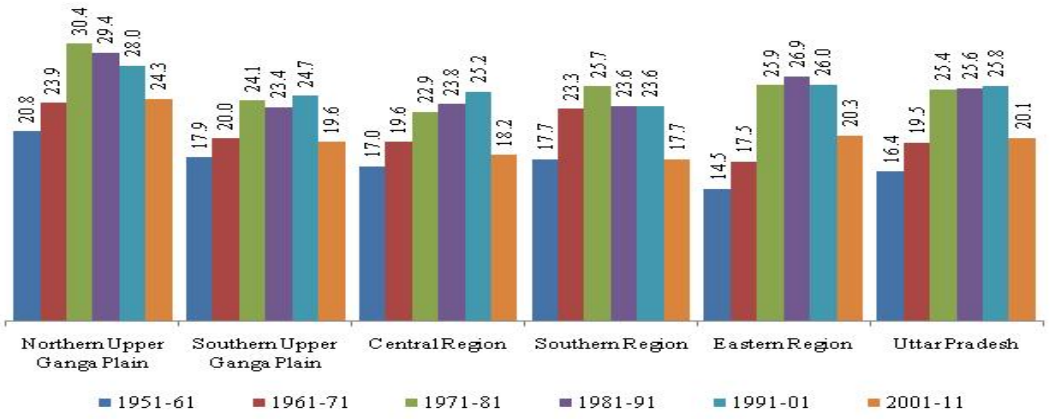


Figure 4: Regional Trends in Decadal Growth Rates in Population (%) of Uttar Pradesh, 1951-61 to 2001-11

However, the population growth rate has not been uniform throughout the state. Figure 4 shows an apparent regional variation in the population growth rate over the period. The Northern Upper Ganga Plain (NUGP) region accounts for the highest population growth rate since 1951-61 (20.8%) to 2001-2011(24.3%). Also, only this region has shown a constant decline in population growth since 1971-81 (30.4%) to 2001-11 (24.3%). Almost all the regions experienced a considerable upward trend in population growth during 1951-61 to 1971-81, and a sharp decline during 1991-2001 to 2001-11. During the recent decade 2001-11, the maximum decline in decadal growth rate was reported by the Central Region (7 percentage point), followed by the Southern Region (5.9 percentage point), the Eastern Region (5.7 percentage point), and the Southern Upper Ganga Plain (5.1 percentage point), while the NUGP (3.7 percentage point) reported the lowest decline.

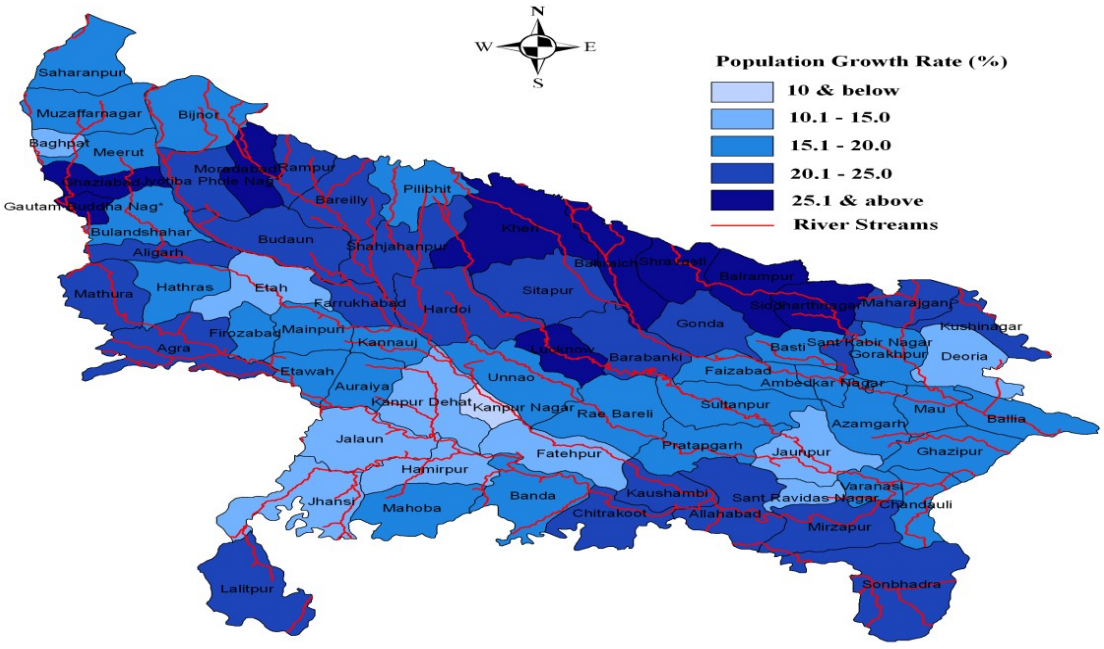


Figure 5: Decadal Population Growth Rate (%) across Districts of Uttar Pradesh, 2001-11

Moreover, there are thirty-one districts indicating higher population growth rate than the state average (20.09%) during 2001-11 (Figure 5). Gautam Buddha Nagar (51.5%) registered the highest growth rate, while Kanpur Nagar (9.72%) had the least population growth during 2001–2011. The districts along main Ganga River, which registered a decadal growth rate of more than 20 percent, are Jyotiba Phule Nagar, Budaun, Farrukhabad, Shahjahanpur, Hardoi, Kaushambi, Allahabad, and Mirzapur.

3.2. Trends in Natural Growth Rate

Birth rate indicates the number of live births per 1,000 population in a reference period. Subtracting the death rate from the birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration. It is interesting to note, as also displayed in Figure 6, that both the birth and death rates in the state are declining apparently with the same pace allowing the natural growth rate ranging between 21 and 24 per 1000 population during 1971-73 to 2007-09. Since 1998-2000 to 2004-06, natural growth rate of population in the state remains stable at 22 per 1000 population. It indicates that the consequent decline in natural growth rate since 2007-09 must be manifested into a sharp decline in the decadal growth rate during 2001-11.

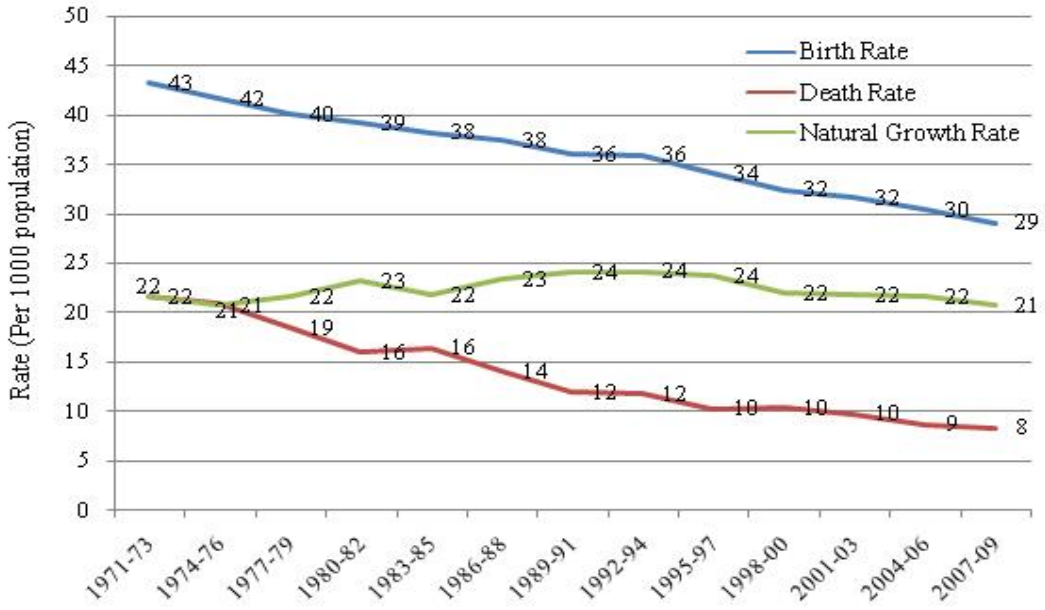


Figure 6: Birth, Death, and Natural Growth Rate (per 1000 population), Uttar Pradesh, 1971-73 to 2007-09

Information on district-wise birth and death rates (along with other mortality indicators) made available by the recently concluded Annual Health Survey (2011)[6] under the aegis of the Registrar General of India provides an opportunity to assess the natural growth rate across different regions and districts of Uttar Pradesh. Figure 7 presents the birth, death, and the natural growth rate across regions of the state. During 2010-11, there was hardly any remarkable difference in

indicators across regions. However, the Eastern Region (ER) accounted for the highest birth and the death rates (27 and 10 per 1000 population respectively) in the state, while the Central Region (CR) reported the lowest birth rate of 23 per 1000 population with the death rate of 8 per 1000 population.

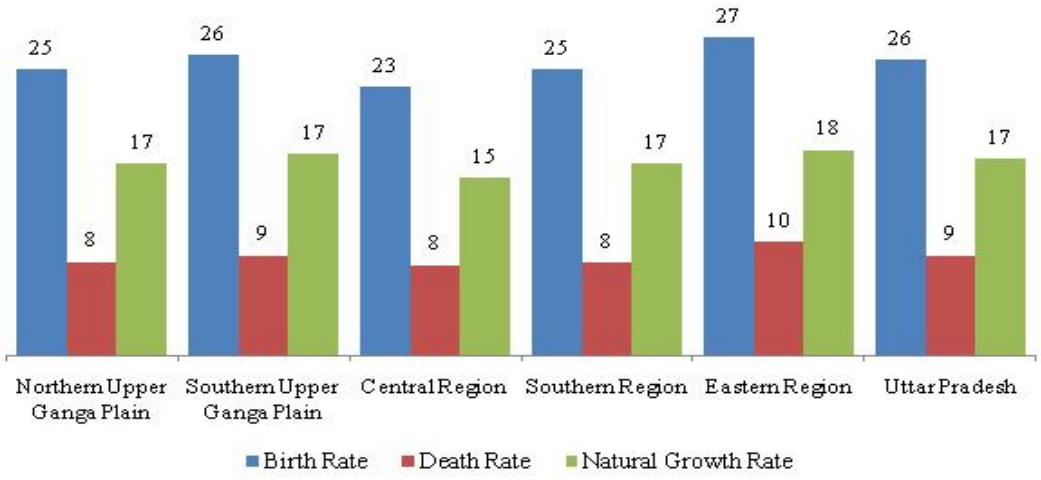


Figure 7: Birth, Death, and Natural Growth Rate (per 1000 population) across Regions of Uttar Pradesh, 2010-11

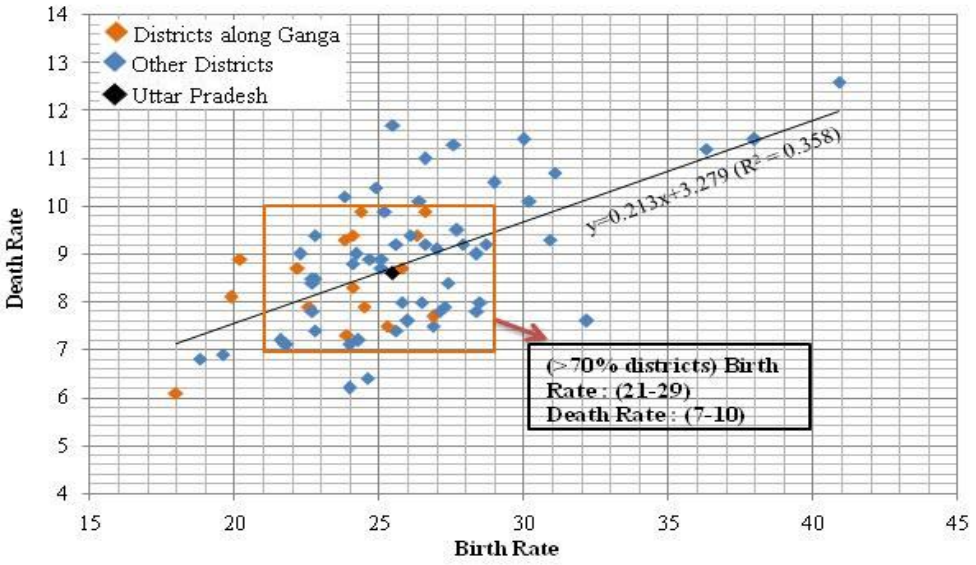


Figure 8: Birth and Death Rate (per 1000 population) across Districts of Uttar Pradesh, 2010-11

Disaggregating further, in more than 70 percent of the districts of the state birth rate was in the range of 21 and 29 per 1000 population, while the death rate ranged between 7 and 10 per 1000 population during 2010-11 (Figure 8). The districts which recorded birth rate more than 30 per 1000 population were Kaushambi, Kushinagar, Budaun, Sant Kabir Nagar, Bahraich, Balrampur,

Siddharth Nagar, and Shrawasti. As regards death rate, Deoria, Balrampur, Basti, Kaushambi, Siddharth Nagar, Faizabad, and Shrawasti recorded as high as 11 per 1000 population and more.

3.3. Distribution of Population

Distribution of population here refers to the allocation of state's total population by area of residence i.e. rural and urban, and the proportional distribution across regions and districts of Uttar Pradesh. Simultaneously, this section also deals with the level of urbanization across districts and regions of Uttar Pradesh, that is nothing but the proportion of districts or regions' total population residing in urban areas.

Figure 9 explicitly demonstrates that the majority of population in the state lives in rural areas, although, the share of population living in urban areas has continuously been increasing. As per the Census 2011, about 22 percent population in the state resides in urban areas compared to 78 percent in rural areas. In terms of absolute population Uttar Pradesh ranks first in the country for rural population (155.11 million or 18.6% of country's total rural), and second for urban population (44.4 million or 11.8% of country 's total urban).

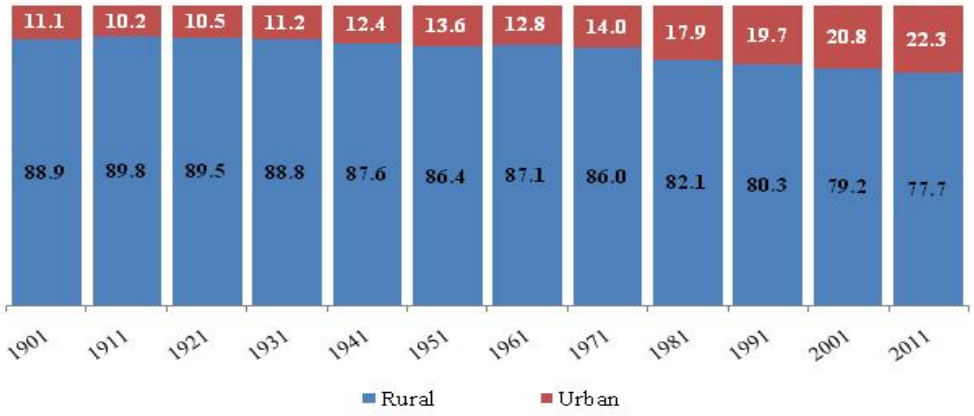


Figure 9: Distribution of Population by Place of Residence, Uttar Pradesh, 1901-2011

There has been a spurt in growth of population in urban areas, even in small towns in the country during the last two decades, more specifically due to migration compared to the natural increase, and also due to the inclusion of new areas under 'Urban' category. These could also be the reasons of increase in urban population in the state.

At regional level, the ER (comprising the largest number of districts in the state), accounts for 45 percent rural and 22 percent urban population of the state and corresponds to lowest level of urbanization at 12.2 percent (Figure 10). On the other hand NUGP region with only 16 percent of total state population and 27% of total state urban population corresponds to the highest level of urbanization (38%) in the state. The Southern Region (SR) of the state is sparsely populated, but the level of urbanization is considerably higher (23%).

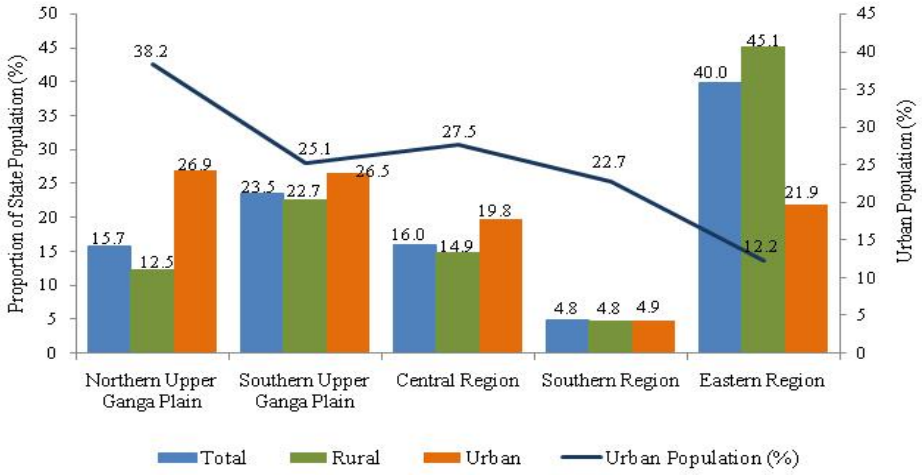


Figure 10: Proportion of State Population (%) and level of Urbanization across Regions of Uttar Pradesh, 2011

There were fourteen districts in the state individually having more than 2 percent of the state population (Figure 11). If they are arranged according to their ranking order, they are Allahabad, Moradabad, Ghaziabad, Azamgarh, Lucknow, Kanpur Nagar, Jaunpur, Sitapur, Bareilly, Gorakhpur, Agra, Muzaffarnagar, Hardoi, and Kheri. In the case of Ghaziabad district a significantly remarkable increase is noticed in its rank as compared to 2001.

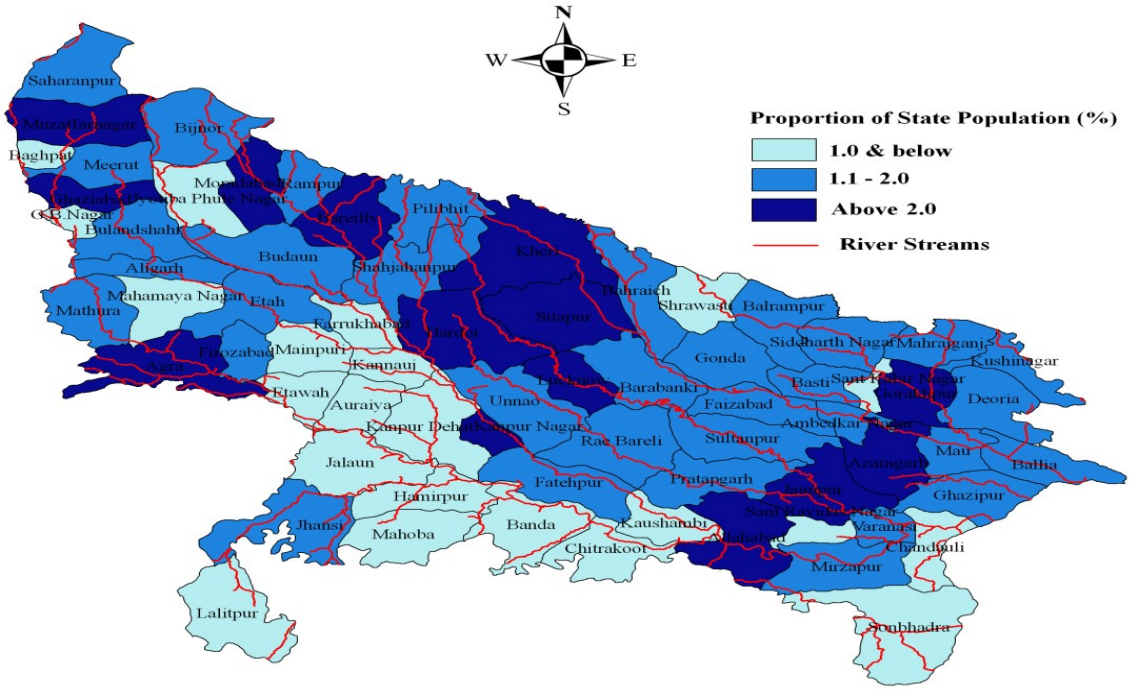


Figure 11: Proportion of State Population (%) across Districts of Uttar Pradesh, 2011

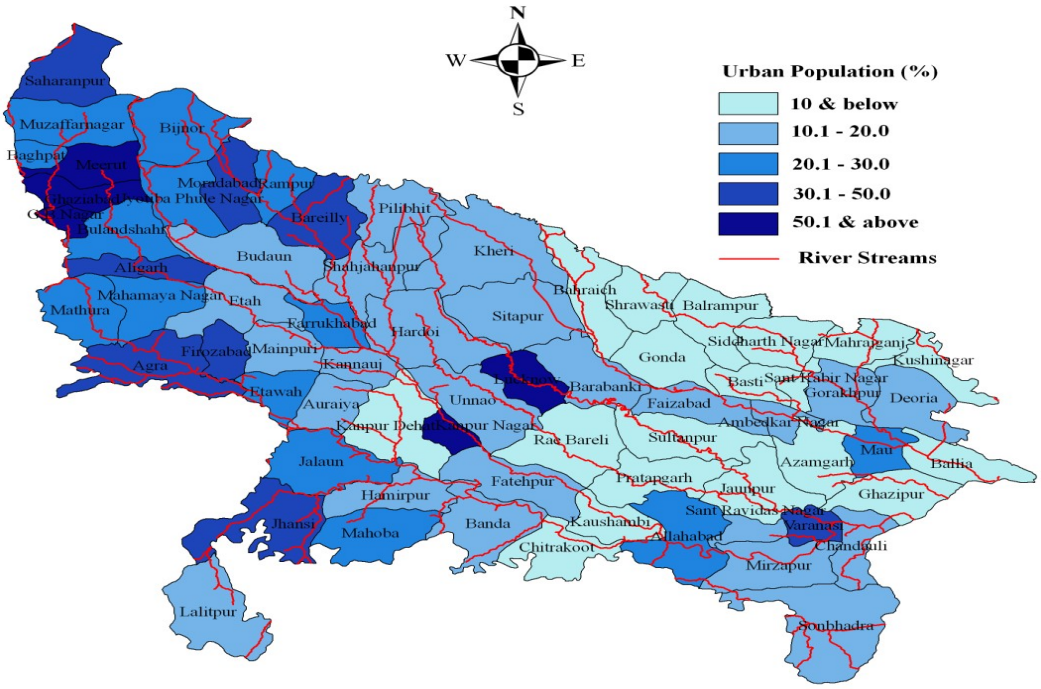


Figure 12: Level of Urbanization (%) across Districts of Uttar Pradesh, 2011

Figure 12 presents the level of urbanization across districts of Uttar Pradesh. There are two prominent and distinct groups, which can be manifested in the above map. Towards the east of Lucknow, there is lighter shade compared to its west. Lucknow, Kanpur Nagar, Meerut, Ghaziabad and Gautam Budha Nagar are five districts, which distinctly appear on the map with more than half of their population living in urban areas. There are eight districts with urban population ranging between 30.1 to 50 percent, out of which three are located in the NUGP region (Saharanpur, Moradabad and Bareilly), three in the SUGP region (Agra, Firozabad and Aligarh), one each in the SR (Jhansi) and the ER (Varanasi) of the state. In fifteen districts urban population wasin the range of 20 to 30 percent, in 24 districts it was between 10 to 20 percent, and in 19 districts it was 10 percent or less.

3.4. Population Concentration

Population concentration characterizes the pattern of population distribution in an area. This is represented by the density of population in particular region, and is calculated in terms of persons per unit area. Density of population suggests clustering, scattering, randomness or uniformity in the distribution of population, which further helps to assess the population pressure on particular area or resources.

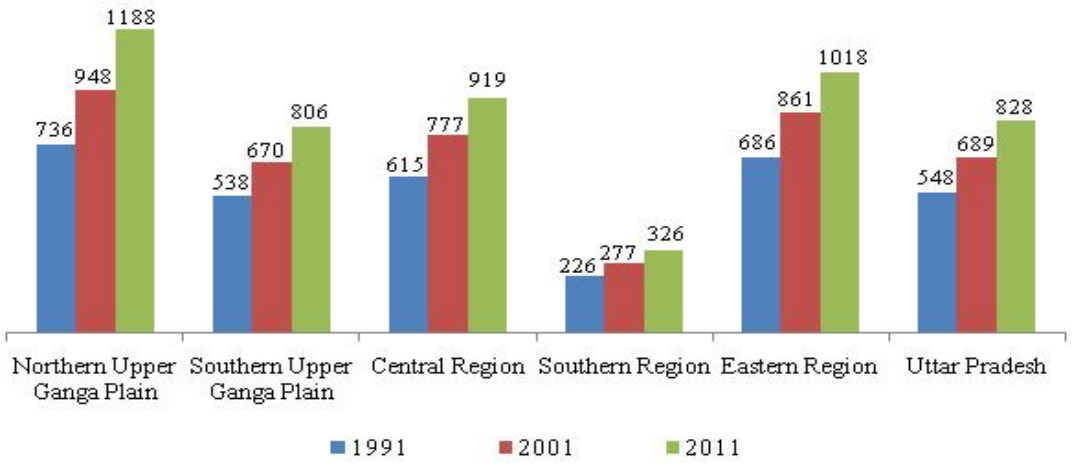


Figure 13: Population Density (persons/sq. km.) across Regions of Uttar Pradesh, 1991-2011

Figure 13 presents the density of population across regions of Uttar Pradesh during 1991-2011. It is noted that there has been a consistent increase in population density in the state and each of its regions over the period. The population density of Uttar Pradesh during 2011 was reported to be 828 persons/sq. km and which corresponds to an increase of 139 persons/sq.km over and above the 2001 situation.

NUGP region has reported the highest population density in the state since 1991 (736 persons/sq. km.) to 2011 (1188 persons/sq. km.), while the SR has always been sparsely populated (226 in 1991 and 326 in 2011). Similar trends are shown in the growth rate of the population density. The population density in the NUGP increased by more than 200 persons/sq. km./decade, followed by the ER, CR and the SUGP region. The population density in the SR matured with a minimal growth of 50 persons/sq. km/decade approximately.

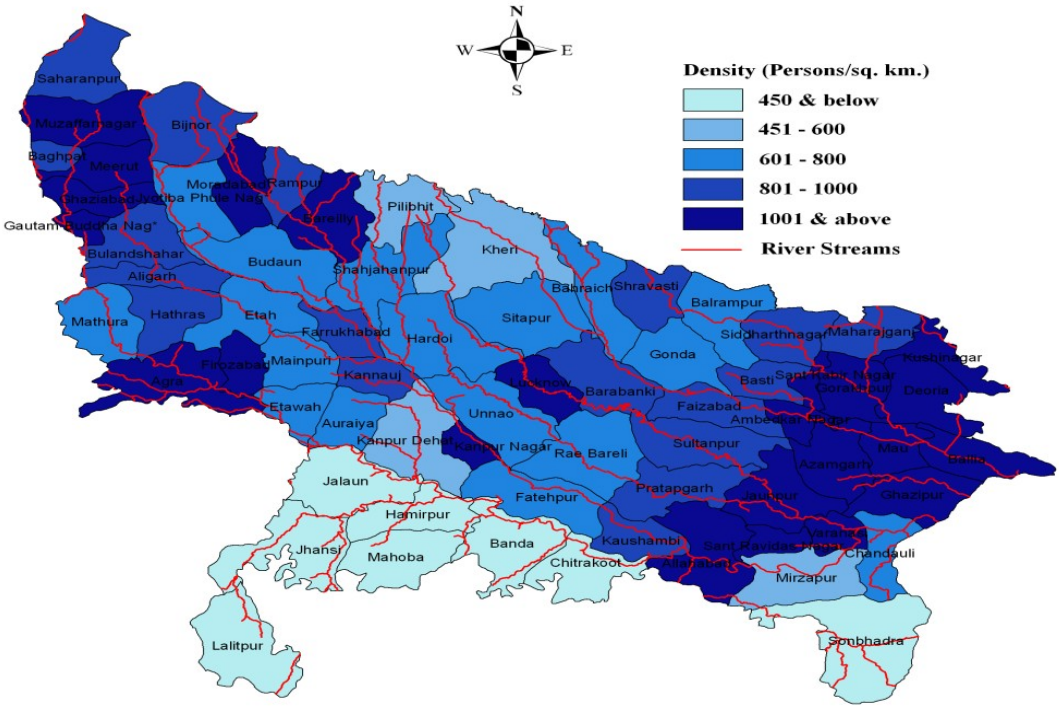


Figure 14: Population Density (Persons/sq. km.) across Districts of Uttar Pradesh, 2011

There are 5 districts in the NUGP namely Muzaffarnagar, Meerut, Ghaziabad, Gautam Budha Nagar, and Moradabad; 3 districts in the SUGP, namely Agra, Bareilly, and Firozabad; 2 districts in the CR(i.e. Lucknow, and Kanpur Nagar); and 13 districts in the ER having the highest population density of 1001 persons/sq. km.& above (Figure 14). These districts also happen to have either River Ganga or its major tributaries flowing through them. On the other hand, the districts in the SR and even in the southern part of the ER have reported lowest population density in the state.

3.5. Population Composition

Population composition here refers to the demographic and the social attributes, which includes population in different age-groups, sex-groups, social groups, and the religious groups. Figure 15 presents the age-sex pyramid of population in the state during 2009-10. The figures are estimated from the 66th round of National Sample Survey (NSS) data. The pyramid presents a typical view of the structure of a developing economy, with broad base and narrow top. During 2009-10, Uttar Pradesh reported almost 37 percent of its population below the age of 15 years, 58 percent between 15-64 years and 5 percent above 64 years. Male dominates (marginally) in the population group up to 19 years of age, while during age 20-64 years the proportion of female population is higher.

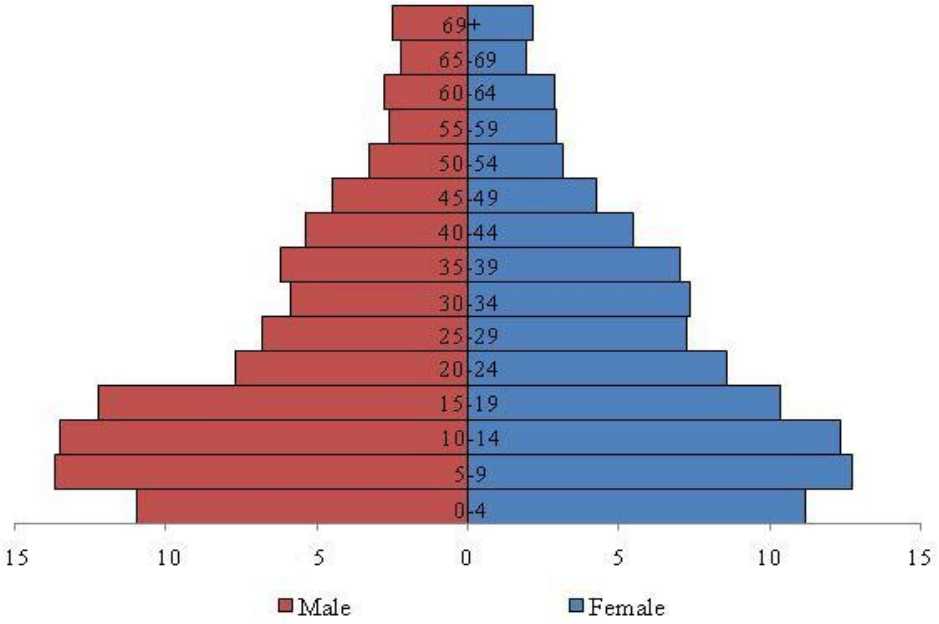


Figure 15: Age-Sex Population Pyramid, Uttar Pradesh, 2009-10

Sex ratio compares the composition of female and male population and is denoted by the number of females per 1000 males. Figure 16 presents sex ratio in Uttar Pradesh since 1901 to 2011; however the figures since 1991 onwards are comparable in the context of bifurcated Uttar Pradesh. Although the level of sex ratio in the state was not appreciable enough, figures seem approaching the satisfactory level during the most recent decade – rising from 898 females per 1000 males in 2001, to 908 by 2011.

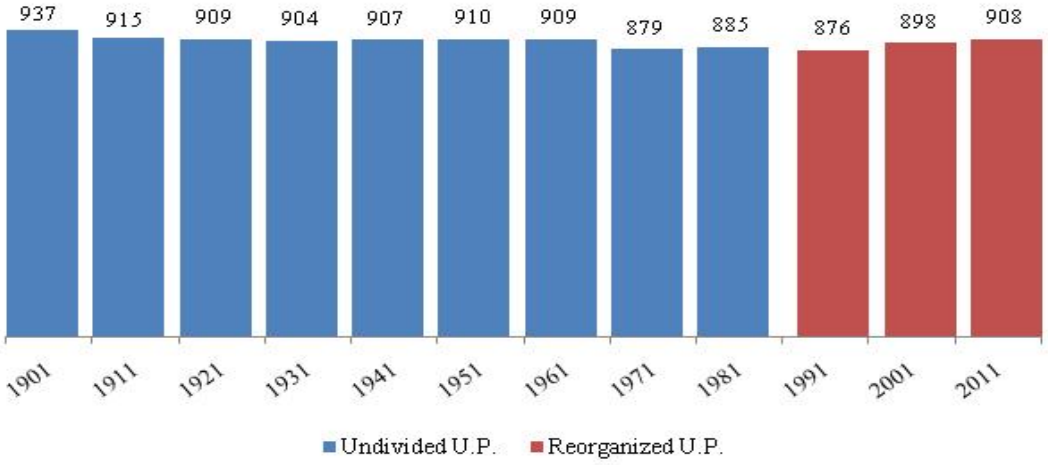


Figure 16: Trends in Sex Ratio (Female/1000 Male), Uttar Pradesh, 1901-2011

Figure 17 presents growth in sex ratio across regions during 1991-2011 where a consistent improvement is noted. However, a comparison of the two decades suggests that there was a sharper increase during the decade 1991-2001 as compared to 2001-2011.

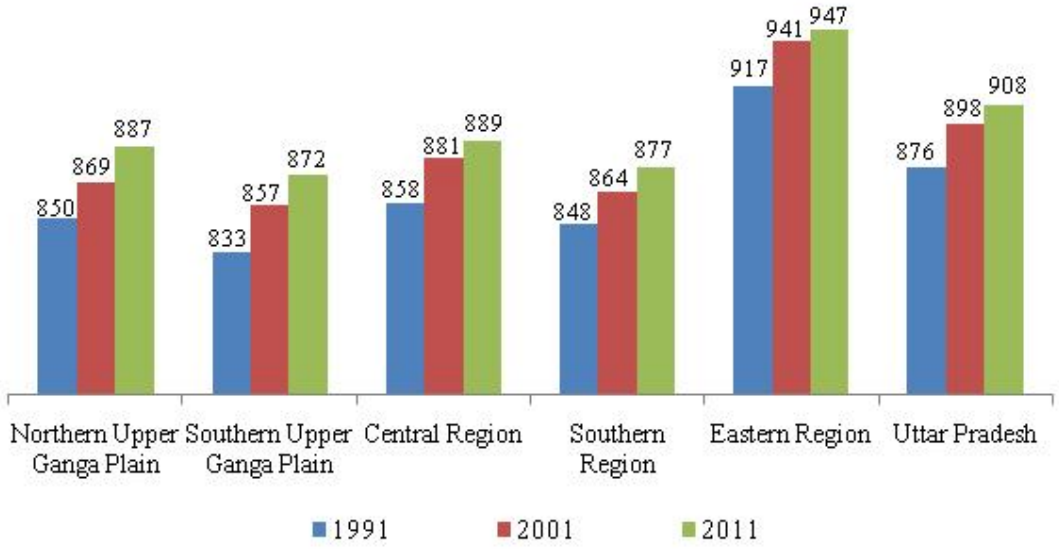


Figure 17: Sex Ratio (Female/1000 Male) across Regions of Uttar Pradesh, 1991-2011

As is evident from Figure 17, during 1991-2001, the SUGP and the ER recorded an increase of 24 females per 1000 males and CR by 23 per 1000 males; whereas during 2001-2011, the SUGP region reported an increase of 15, the ER of 6, and the CR of 8 females per 1000 males.

Figure 18 provides an idea of the sex ratio across districts of Uttar Pradesh in 2011. It also suggests a higher level of sex ratio in districts of the ER. It may be further pointed out that 13 districts in the state have a sex ratio of 951 females per 1000 males or more as per census 2011, followed by 10 districts with sex ratio ranging between 911 and 950, 14 districts in the range 891 to 910, 17 districts in the range 871 to 890, and 17 districts in the range 870 females per 1000 males and below.

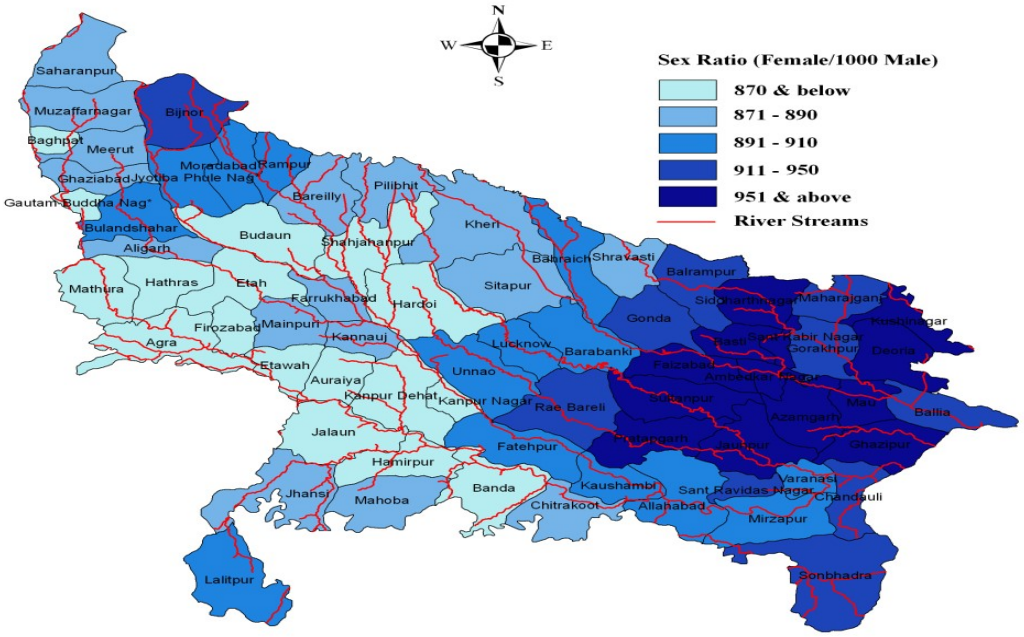


Figure 18: Sex Ratio (Female/1000 Male) across Districts of Uttar Pradesh, 2011

As highlighted in Figure 18, as per Census 2011 highest sex ratio was reported in Jaunpur (1018), followed by Azamgarh (1017), and Deoria (1013), while the lowest sex ratio was found to be in Gautam Buddha Nagar (852). Skewed ratio in GB Nagar (Noida) can be attributed to, among others, higher level of industrialization leading to male dominated occupations.

Comparing with figures of Census 2001, an increase was recorded in number of females per 1000 males although with a variation across districts. Nevertheless, the highest increase was noticed in Sant Ravidas Nagar (33), Sidharthanagar and Faizabad (22 each) and Basti (21). Shrawasti was the only district maintaining the same sex ratio in both the decades.

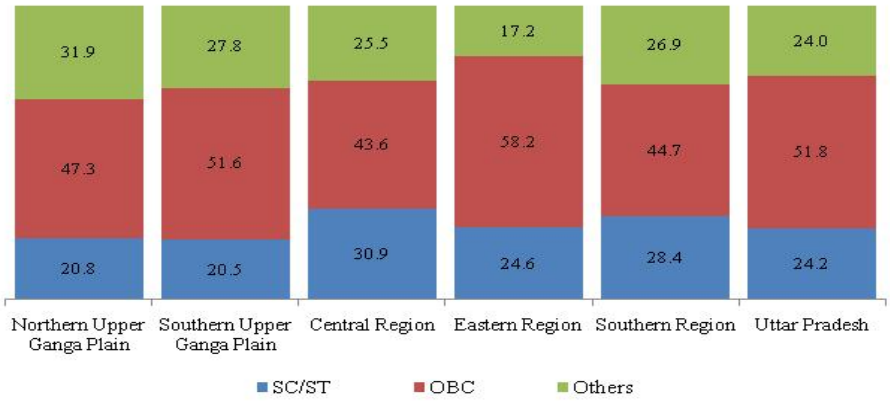


Figure 19: Proportion (%) of Population by Social Group, Uttar Pradesh, 2009-10

Figure 19 presents the proportion of population in different social groups across regions of Uttar Pradesh, and is estimated from the 66th round of National Sample Survey (NSS) data. The state

reported more than 50 percent of OBCs (Other Backward Castes) population during 2009-10. Majority of this population lives in the ER (58.2%) and the SUGP (51.6%). Majority of the SC/ST population lives in the CR and the SR.

Majority of the population in the state belongs to two main religious groups i.e. Hindus and Muslims and the population belonging to other religious groups is negligible i.e., even less than 1 percent. The proportion of Hindu population across the state is 82.8%, though there are variation across regions (Figure 20). Population of Hindus was proportionately highest in the SR (94.8%) and lowest in the NUGP (68.4%) region. Since only two religious groups are prominent in the state, the proportion of one religious group is complementary to another. In other words, if the proportion of Hindu population is more in any region, the Muslim population will obviously be proportionally less. Hence, Muslim population was reported to be highest in the NUGP, and lowest in the SR. Other three regions of the state had more or less the same proportion of population belonging to Hinduism and Islam religious group.

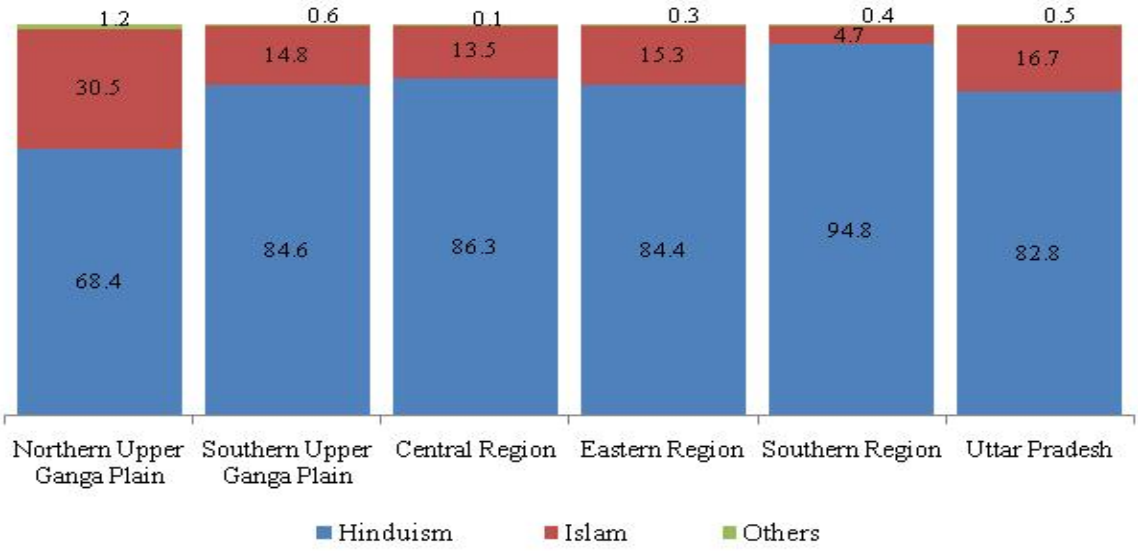


Figure 20: Proportion (%) of Population by Religious Group, Uttar Pradesh, 2009-10

3.6. Population Dependency

Population dependency indicates the potential effects of changes in population age structures for social and economic development, pointing out broad trends in social support needs. This is measured by the dependency ratio, which relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old). By relating the group of the economically dependent population (net consumers) to the group most likely to be economically active (net producers), it provides an indication of the potential social support requirements resulting from changes in population age structures. In addition, the ratio highlights the potential dependency burden on workers and indicates the shift in dependency from a situation in which children are dominant to one in which older persons outnumber children as the demographic transition advances (i.e. the transition from high mortality and high fertility, to low mortality and low fertility). A high dependency ratio indicates that the economically active

population and the overall economy face a greater burden to support and provide the social services needs of the dependent children and older persons.

Figure 21 illustrates the proportion of population in different age groups during 2009-10. During the period under consideration, Uttar Pradesh reported almost 37 percent of its population below the age of 15 years, 58 percent between 15-64 years, and only 5 percent above 64 years. The figures are estimated using information retrieved from the 66th round National Sample Survey (NSS). Based on this information, the child dependency ratio and the aged dependency ratio were computed for Uttar Pradesh and its regions (Figure 22).

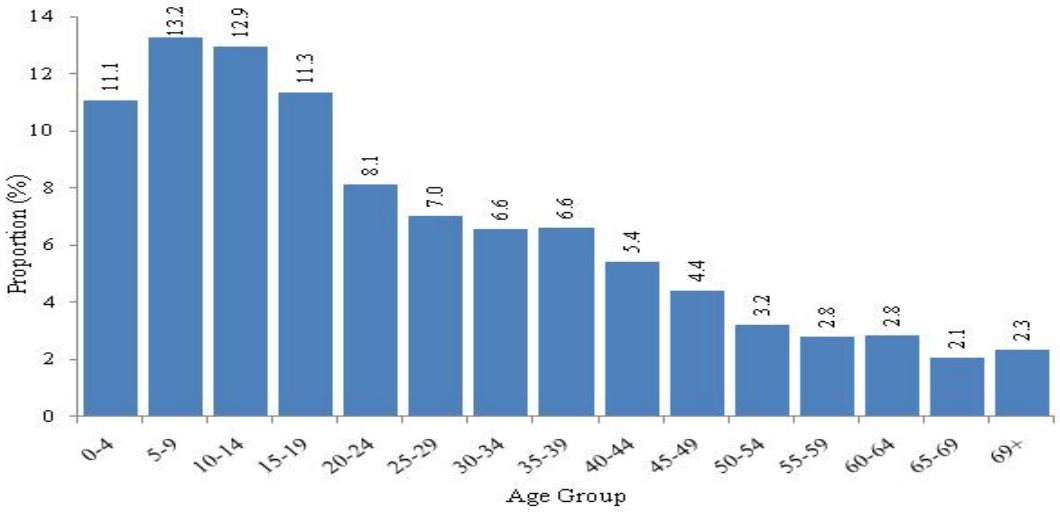


Figure 21: Proportion (%) of Population by Age Group, Uttar Pradesh, 2009-10

The child dependency ratio is a ratio of children or adolescent population (age 0-14 years) to the working age population (15-64 years). Similarly, the aged dependency is calculated as a ratio of aged population (65 years and above) to the working age population (15-64 years). These measures (in percent) are presented in Figure 22.

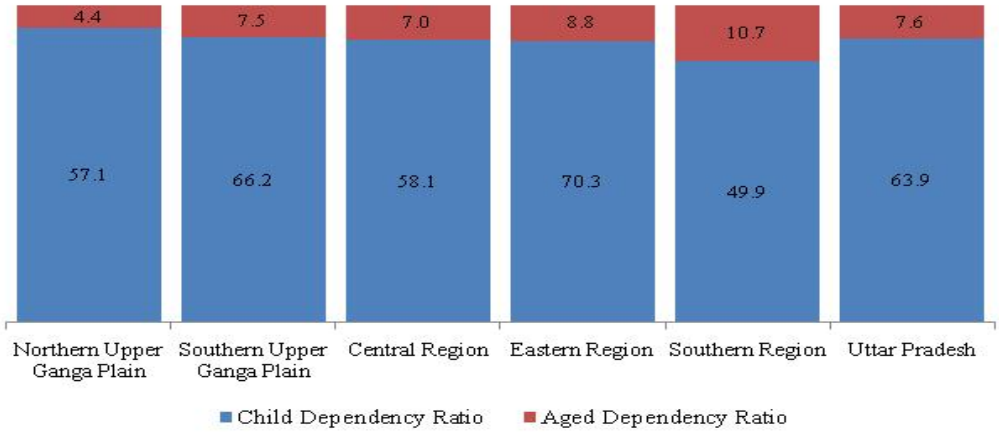


Figure 22: Child & Aged Dependency Ratio (%), Uttar Pradesh, 2009-10

During 2009-10 child dependency ratio was about 64 percent and the aged dependency was about 8 percent which together lead to an overall dependency ratio of 71%. The highest overall dependency (and child dependency) ratio was reported in the ER (79%), followed by the SUGP (74%). However, the highest aged dependency ratio was observed in the SR (11%). Figure 23 presents overall dependency ratio (%) across districts of Uttar Pradesh during 2009-10.

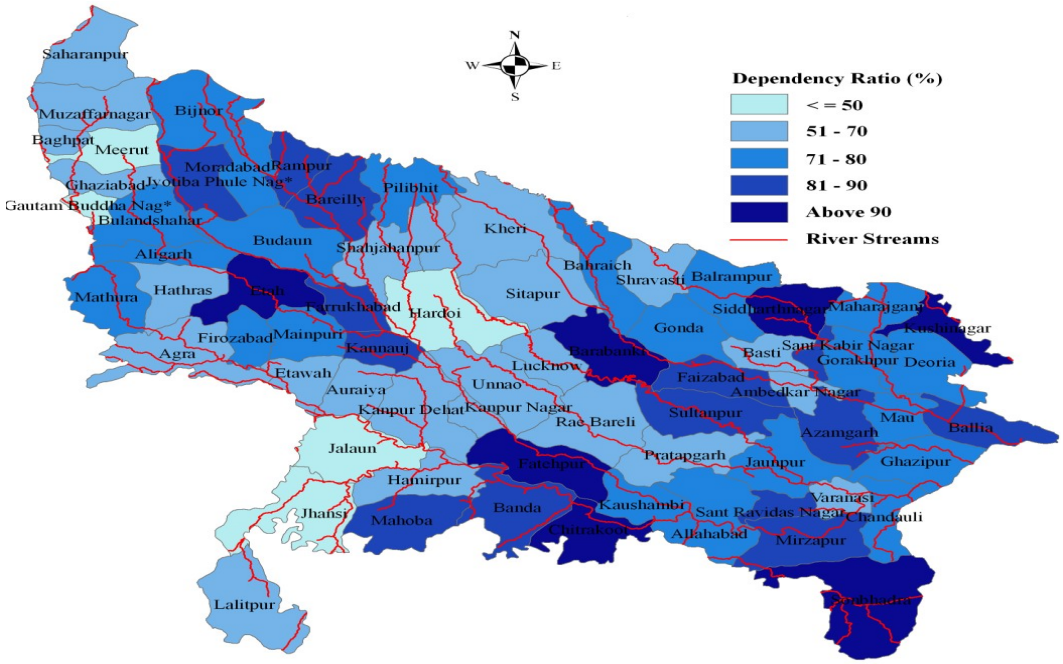


Figure 23: Overall Dependency Ratio (%) across Districts of Uttar Pradesh, 2009-10

As is evident from Figure 23, Siddhartha Nagar (119%) reported the highest dependency ratio (Child dependency of 112%), followed by Sonbhadra (104%), Kushinagar (102%), Chitrakoot (95%), Fatehpur (95%), Etah (93%), and Barabanki (92%). The highest aged dependency ratio was observed in Mahoba district (23%), followed by Kannauj (15%), Fatehpur (15%), and Chitrakoot (14%). In the Northern and the Southern Upper Ganga Plain regions, dependency ratio among the districts along Ganga River was observed to be more than 70 percent during 2009-10.

4. Economic Indicators

4.1. Gross (State) Domestic Product

Uttar Pradesh is the largest economy of North India and second largest economy in the country. However, not long ago, its was a laggard state in terms of economic growth. While during 1980s, UP's economy grew at roughly the same rate as that of India overall (5.0 vs. 5.6 percent per annum growth of GSDP and GDP, respectively), its growth rate decelerated to 3 percent per annum during 1990-95 period. During the period 1999-2008 when India grew at an average of 7.4 percent per year, Uttar Pradesh registered an average growth rate of just 4.4 percent per annum i.e., 3 percent below All India average. Nevertheless in 2010-11 the state's domestic product grew by 8 per cent which is closer to All India average of 8.4 per cent. Only five states viz., Bihar,

Chhattisgarh, Maharashtra, Punjab, and Uttar Pradesh have grown faster than their target growth rate during the 11th Five-Year Plan period [7]. The Gross State Domestic Product (GSDP) of the state has registered a smooth rise from 173.1('000 crores) during 1999-2000 to 254.4 ('000 crores) during 2007-08 adding 81.3 thousand crores in nine years, with an average increase of approximately 9 thousand crores every year (Figure 24).

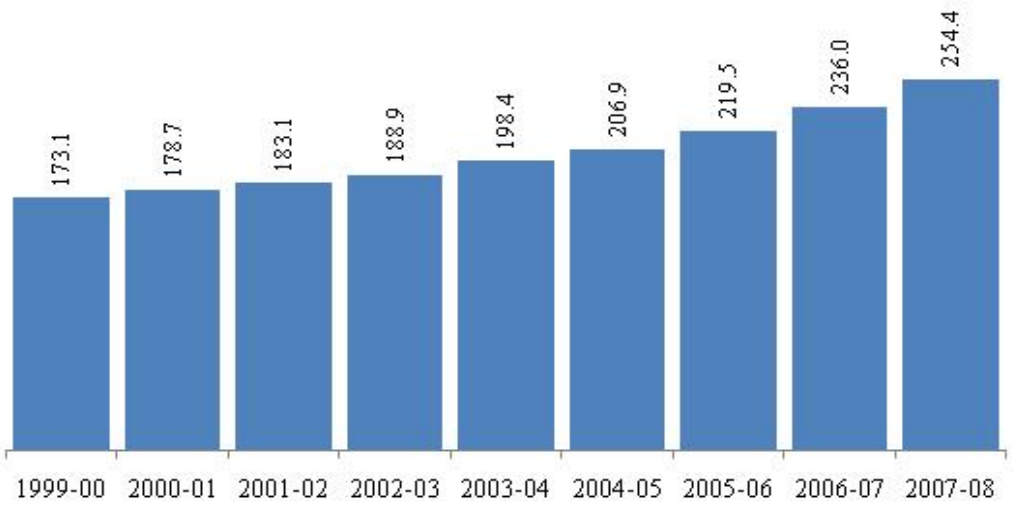


Figure 24: GrossState Domestic Product (Rs. '000 Crores), Uttar Pradesh, 1999-2008

The figure of 1999-2000 is adjusted to the present boundary of Uttar Pradesh excluding the districts of Uttarakhand to make it comparable with figures for the subsequent years (based on 1999-00 constant prices). To unfold, during 1999-2000 to 2002-03, GSDP of the state grew about 5-6 thousand crores per annum in absolute term, whereas from 2002-03 to 2003-04 and 2003-04 to 2004-05, it increased by 9.5 and 8.5 thousand crores respectively. Surprisingly, from 2004-05 onwards, GSDP of the state recorded rise of 300% as compared to previous years (i.e. 12.6, 16.5, and 18.4 thousand crores).

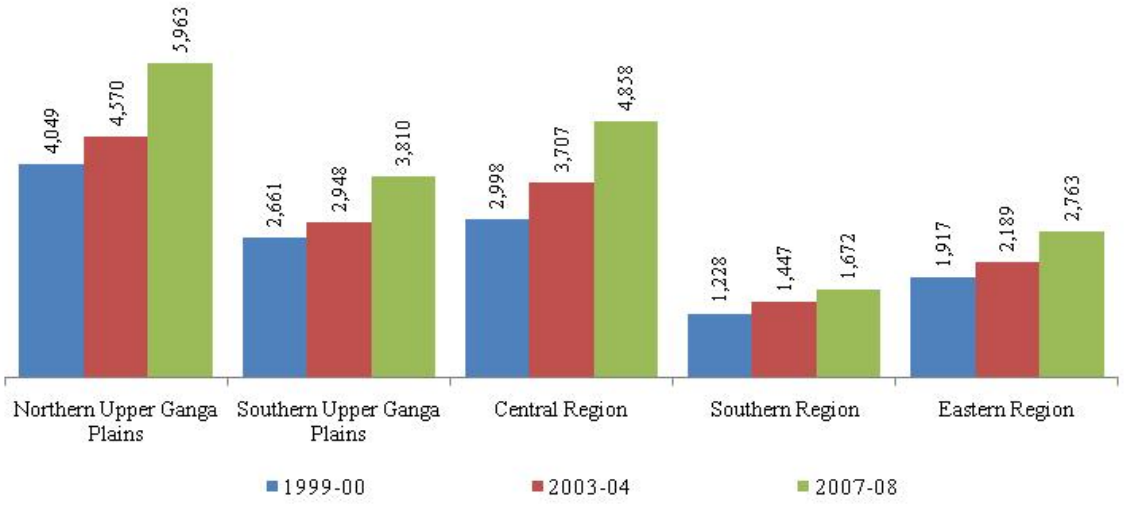


Figure 25: Average GSDP (Crore Rs.) across Regions of Uttar Pradesh, 1999-2008

Figure 25 depicts the average gross district domestic product (at 1999-00 constant price) across regions of Uttar Pradesh. During 1999-00 to 2003-04, the maximum increase in average district domestic product was recorded in CR (Rs. 709 crore), followed by the NUGP (Rs. 521 crores), SUGP (Rs. 287 crore), ER(Rs. 272 crore) and the SR (Rs. 219 crore). However, during 2003-04 to 2007-08, the maximum increase was observed in the NUGP (Rs. 1393 crore), followed by CR (Rs. 1151 crore), SUGP (Rs. 862 crore), ER (Rs. 574 crore) and the SR (Rs. 225 crore).

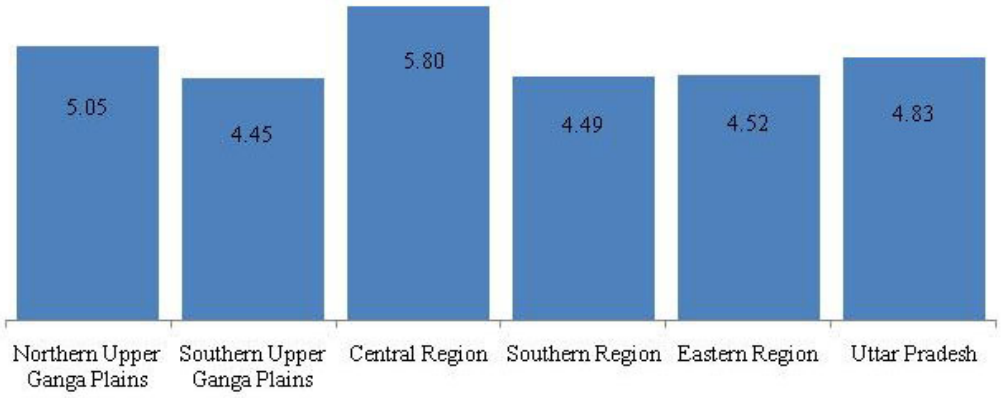


Figure 26: Region-wise CAGR (%) of GSDP in Uttar Pradesh, 1999-2008

To sum up, the GSDP of Uttar Pradesh grew with a cumulative annual growth rate (CAGR) of 4.83 percent during 1999-2008 (Figure 26). The average Gross District Domestic Product in the CR appears to have recorded the highest annual growth rate of 5.8 percent during the same period, followed by the NUGP (5.05%). However, the CAGRs in other regions were recorded below the state average of around 4.5 percent.

4.2. Per Capita Gross Domestic Product

Figure 27 presents the trend in per capita GSDP of Uttar Pradesh during 1999-00 to 2007-08. Over the 8 year period, the per Capita GSDP of Uttar Pradesh has increased from Rs. 10,759 to Rs. 13,475. representing a CAGR of 2.85%. However, it is noted that the economy picked up momentum in the later years. For instance during 1999-00 to 2002-03, average annual increase was Rs. 56.25, which went up to Rs. 585 during 2002-03 to 2004-05 and Rs. 469 during 2004-05 to 2007-08.

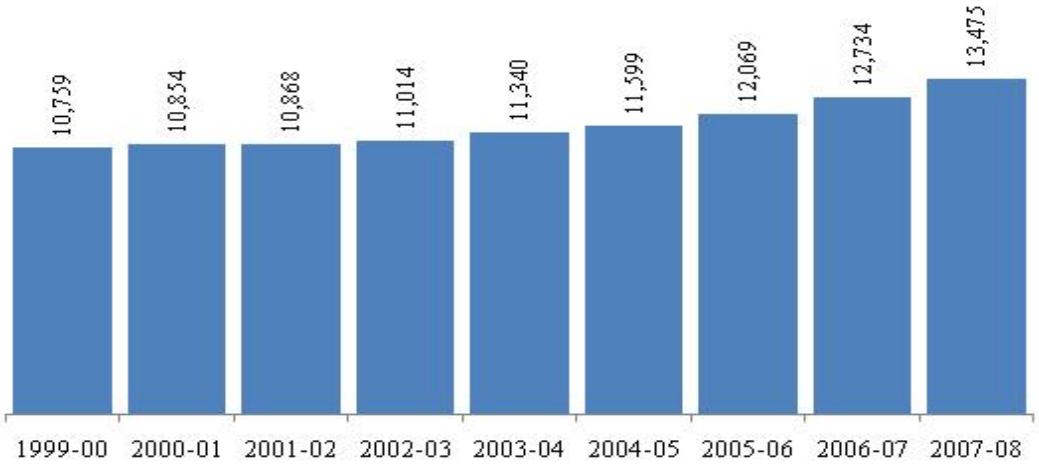


Figure 27: Per Capita GSDP (Rs.) in Uttar Pradesh, 1999-2008

The average per capita gross district domestic product (GDDP) in the NUGP was recorded to be the highest during 1999-2008 as compared to other regions in the state (Figure 28). However, the ER accounted for the lowest average per capita GDDP in the state which indicates weak economic based in the region.

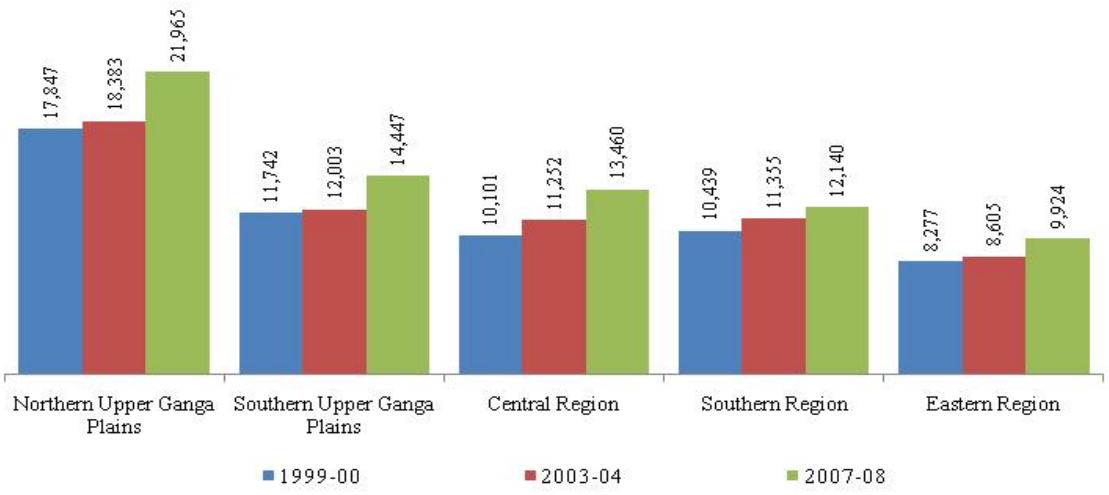


Figure 28: Average per Capita GDDP (Rs.) across Regions of Uttar Pradesh, 1999-2008

As brought to the fore in Figure 28, the CR recorded the highest and the SUGP witnessed the lowest absolute increase in the average per capita GDDP from 1999-00 till 2003-04. However, during 2003-04 to 2007-08, the Northern and the Southern Upper Ganga Plain regions had witnessed the highest and the second highest increase in the average per capita GDDP.

Overall, the per capita GSDP of Uttar Pradesh grew with a cumulative annual growth rate (CAGR) of 2.57 percent during 1999-2008 (Figure 29).

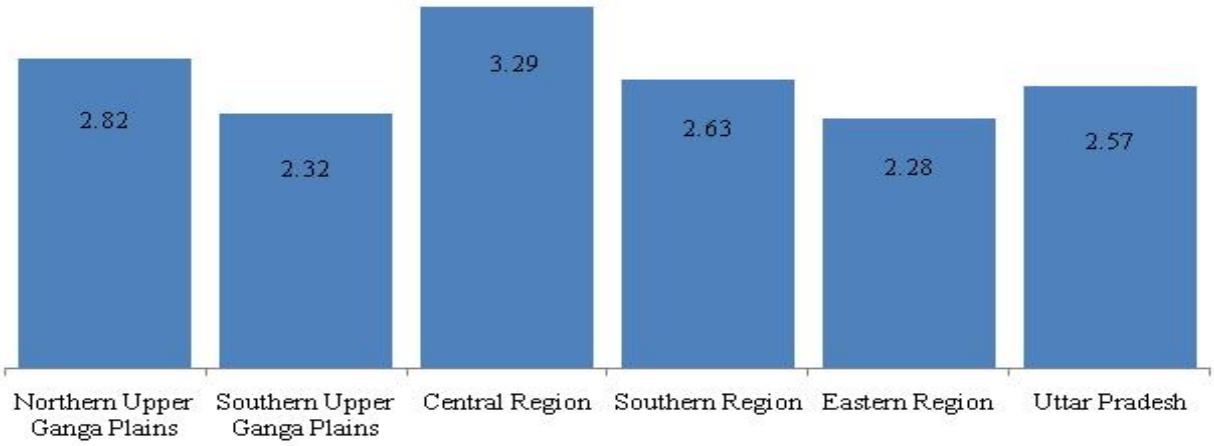


Figure 29: Region-wise CAGR (%) of Per Capita GSDP in Uttar Pradesh, 1999-2008

In sync with the pattern of growth as observed in the case of average GDDP across regions, the average per capita GDDP in the CR registered the highest annual growth rate of 3.29 percent in the state during the same period, followed by the NUGP (2.82%). However, the CAGRs in other regions were recorded below the state average at around 2.3 percent except for the SR which was at 2.67%. Figure 30 presents the district wise pattern of GDDP and it is noted that it is highly concentrated in the north-western part of the state.

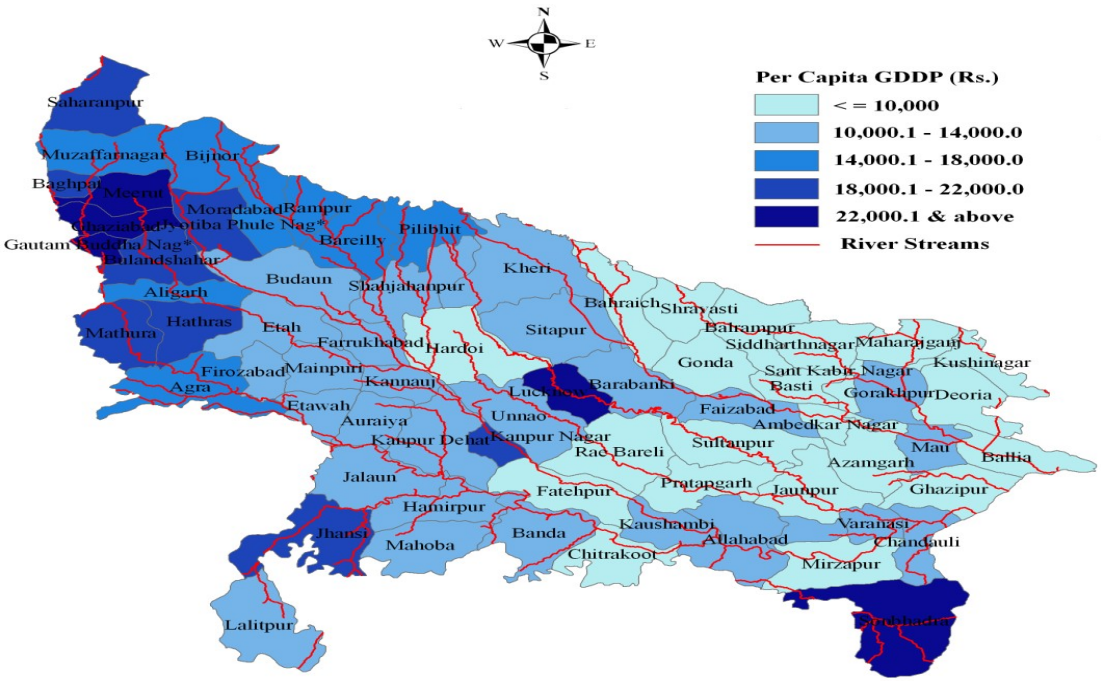


Figure 30: Per Capita GDDP (Rs.) across Districts of Uttar Pradesh, 2007-08

From Figure 30 it is also evident that the districts in the north-eastern part of the state significantly lagging behind in terms of economic growth. . Districts along Ganga River, which recorded a per capita GDDP less than Rs. 10,000 were Hardoi (Rs. 9,612), Fatehpur (Rs. 9,790) and Mirzapur (Rs. 9,645).

4.3. Sectoral Composition of GSDP

Figure 31 presents the trend in the sectoral composition of GSDP of Uttar Pradesh during 1999-2000 to 2007-08 (at 1999-00 constant price). It is clearly manifested in the graph that the maximum contribution in the GSDP was made by the tertiary sector while that from the primary sector registered a decline of 8% points. During 1990-00, there was a gap of about 13 percentage points between the contribution of primary sector (36%) and the secondary sector (22.2%) in the GSDP. However, during 2007-08, this gap narrowed down to two percentage points.

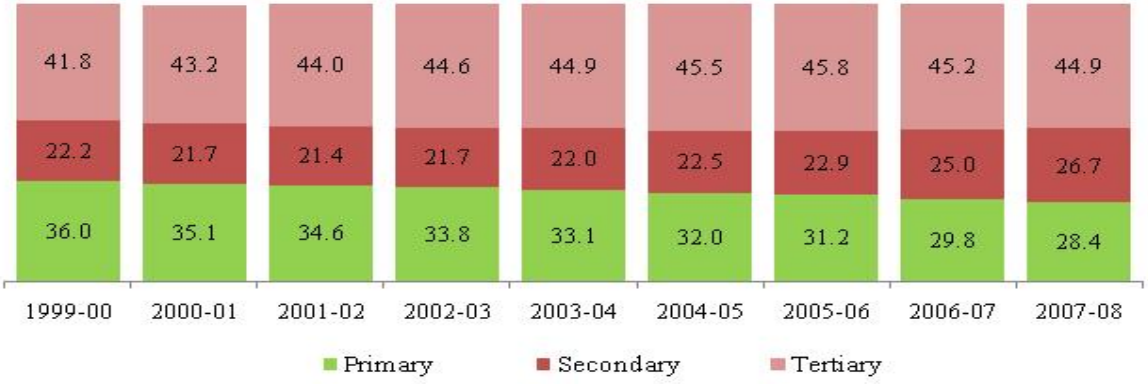


Figure 31: Sectoral Composition of GSDP (%) in Uttar Pradesh, 1999-2008

Disaggregating the share of sectoral composition in GSDP at regional level (Figures 32), the ER and the NUGP appeared to have accounted for the maximum share in the primary sector of the state economy.

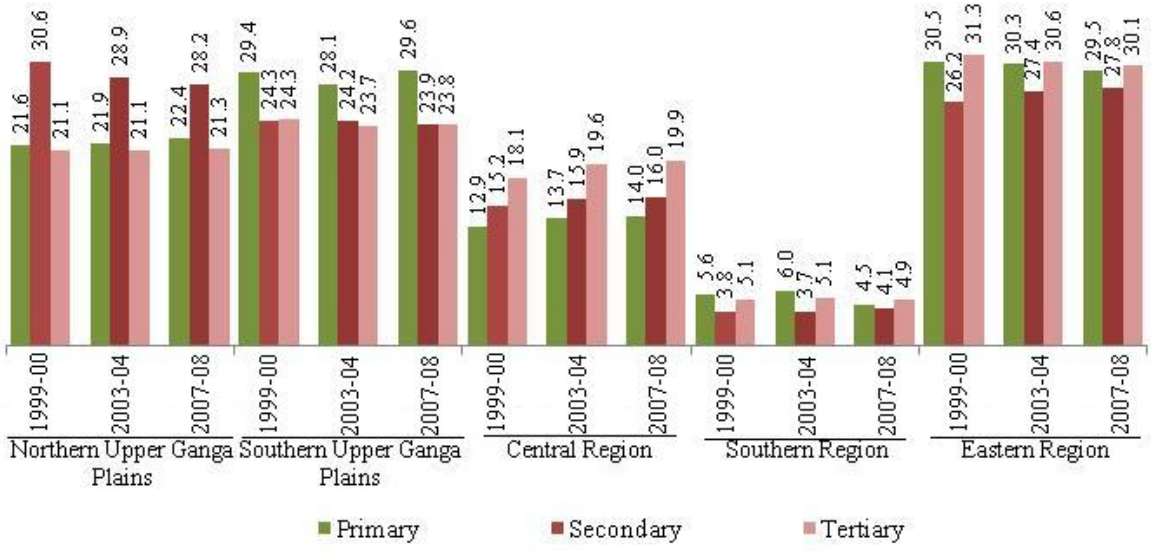


Figure 32: Sectoral Composition of GSDP (%) across Regions in Uttar Pradesh, 1999-2008

Although the ER also contributes to the secondary sector in significant amount, the NUGP accounts for the maximum share of the secondary sector in GSDP (marginally higher than the share of the ER). Moreover, the maximum share in the tertiary sector of the SGDP was recorded by the ER (30% during 2007-08), followed by the SUGP and the NUGP. Figure 33 displays the share of different economic sectors in the GSDP within regions of Uttar Pradesh during 1999-00 to 2007-08.

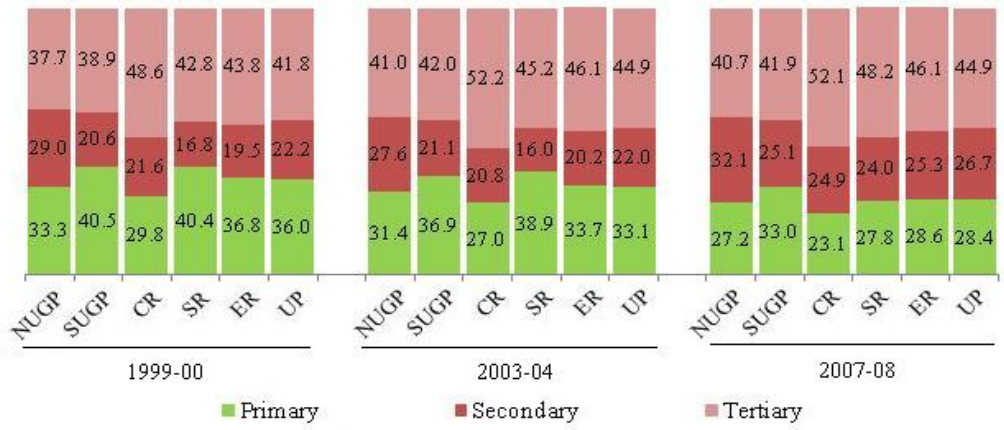


Figure 33: Region-wise Sectoral Composition of GSDP (%) in Uttar Pradesh, 1999-2008

As is indicated in Figure 33, the SUGP (33%) had the maximum share of primary sector in GSDP among all the regions; the NUGP (32%) had the maximum share in secondary sector, while the highest share in tertiary sector was recorded by the CR (52%) during 2007-08.

Figure 34 presents the spatial distribution in sectoral composition of GDDP across the districts of Uttar Pradesh during 2007-08. On an average, the share of tertiary sector in the GDDP appeared to be the maximum in all districts of the state.

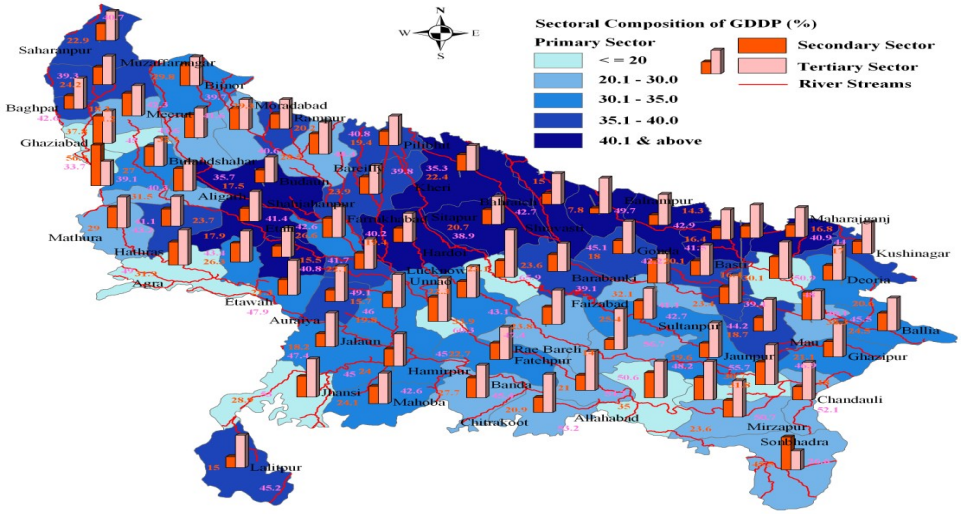


Figure 34: Sectoral Composition of GDDP (%) across Districts of Uttar Pradesh, 2007-08

As can be seen through Figure 34, the districts with more than 42 percent share of primary sector in the GDDP were Budaun (46.8%), Mainpuri (43.7%), Balrampur (42.7%), Shravasti (42.5%), Maharajganj (42.3%), Kheri (42.3%), Bahraich (42.2%), and Siddharth Nagar (42.1%). Similarly, Gautam Buddha Nagar (56.7%) had the highest share of secondary sector in the GDDP, followed by Sonbhadra (45.5%) (power and smelting). Other districts had less than 40 percent share of secondary sector in GDDP. There were 12 districts in the state which had recorded more than 50 percent share of tertiary sector in GDDP, whereas the districts like Lucknow (65.9%), Kanpur Nagar (60.3%), Pratapgarh (56.7%), and Varanasi (55.7%) accounted for more than 55%share of tertiary sector in GDDP.

4.4. Trends in Occupational Structure

Table 1 presents the proportion (%) of households by main occupation in rural and urban areas separately in Uttar Pradesh during 1983-2010. The figures are based on the quinquennial rounds of the given reference periods (i.e. 38th, 43rd, 50th, 55th, 61st, and 66th round) of National Sample Survey (NSS) data. There is a clear indication of decline in the proportion of households engaged in agricultural activities in rural Uttar Pradesh. It is pertinent to mention here that the figures shown in Table 1 are based on households implying that they indicate the main occupation of the household (as the member of household may involve in different activities, but the source of highest earning is considered as the main occupation of the household) that sustain their livelihoods. The proportion of households which were self-employed in agricultural activities

declined from 56 percent in 1983 to 48 percent in 2009-10. Similarly, the proportion of households which were involved as agricultural labourers also declined from 18 percent (1983) to 11 percent (2009-10). Due to increasing employment opportunities in non-agricultural activities, especially after the advent of the National Rural Employment Guarantee Act (NREGA), the share of non-agricultural labourers has increased almost two times between 2004-05 and 2009-10 in rural Uttar Pradesh.

Over the period under consideration the urban areas of the state do not witness any noticeable change in the occupational structure . However, the data indicate a marginal declining trend in the proportion of households involved in regular wage/salary earnings and an increase in self employed economic activities and casual labourers.

Table1: Household Main Occupation (%) in Rural and Urban Areas, Uttar Pradesh, 1983-2010

Particulars	1983	1987-88	1993-94	1999-00	2004-05	2009-10
Rural Area						
Self-employed in non-agriculture	13.1	12.7	13.2	14.7	18.5	16.0
Agricultural labourers	18.0	20.1	15.3	19.7	13.7	11.3
Other labour	4.1	5.5	3.9	5.7	9.2	18.1
Self-employed in agriculture	56.2	53.9	54.2	46.8	49.2	44.7
Others	8.6	7.7	13.3	13.2	9.4	9.8
Urban Area						
Self employed	45.1	45.6	46.4	46.7	49.3	43.5
Regular wage/salary earning		35.3	34.0	33.9	34.0	30.2
Casual labour		9.1	9.3	10.4	8.8	12.7
Others	54.9	10.0	10.3	9.0	7.9	13.5

Note: Computed from the unit level data of concerned NSS rounds.

4.5. Population Below Poverty Line

Figure 35 presents the spatial distribution of population below poverty line (%) across districts of Uttar Pradesh in 2002[8].

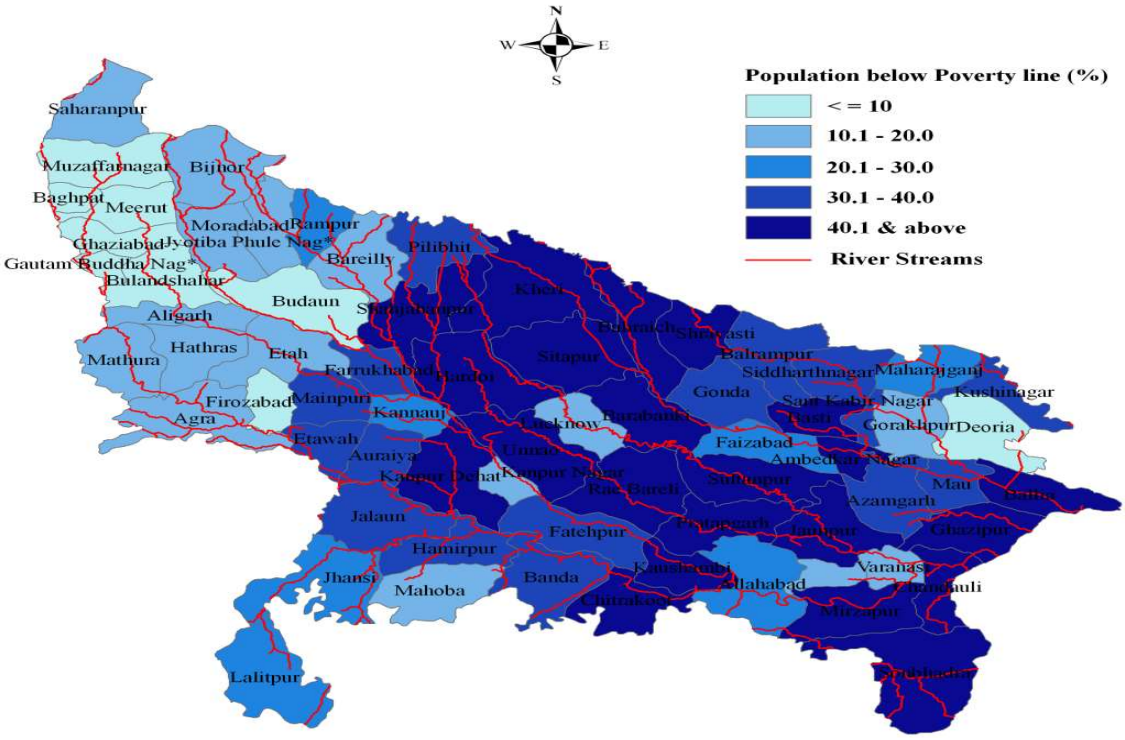


Figure 35: Population below Poverty Line (%) across Districts of Uttar Pradesh, 2002

BOX-4.5.1. UP has highest number of BPL families[9,10] on July 3rd, 2009, the Ministry of Rural Development, GOI, declared that Uttar Pradesh, Bihar and Maharashtra figure among the list of states with large number of people living below poverty line. The latest estimates released by the Planning Commission for the year 2004-05 reveals that Uttar Pradesh has the largest BPL population with 590.03 lakh people living below the poverty line. While Bihar with 369.15 lakh and Maharashtra with 317.38 lakh BPL population follow it. These figures are based on URP consumption data . However as per available estimates, the percentage of people living below poverty line has come down from 37 percent in 1993-94 to 27.5 percent in 2004-05.

The Rural Development Department of the State Government has conducted a survey in the year 2002-03 on the basis of 13 parameters relating to economic and social indicators, which has revealed that the population below poverty line in Scheduled Castes constituted about 60%. Thus, higher incidence of poverty among Scheduled Castes is a cause of concern and needs to be arrested on priority basis. Of the total number of BPL families living in UP, the highest are located in Unnao, just 30 kilometres away from the state capital.

Figure 35 manifests that the higher proportion of population, living below poverty line as per the 2002 BPL Census, is concentrated in the ER except for some districts like Varanasi, Deoria, Gorakhpur etc.; in the CR excluding Lucknow, and Kanpur Nagar; and in some of the districts of the SUGP. The top five districts with the highest proportion of population below poverty line in the

state were recorded as Bahraich (78%), Kaushambi (69%), Hardoi (65%), Ambedkar Nagar (61%), and Sonbhadra (57%).

4.6. Trends and Pattern in Banking

Table 2 presents selected statistics related to commercial banks in Uttar Pradesh during 2003-11. The data show that the number of bank offices has increased significantly in last 8 years during 2003-11. The number has gone up from 8,366 in 2003 to 11,119 in 2011, a net increase of about 33 percent. In rural areas, the number of bank offices is much higher than that in semi-urban and urban areas. During the last 8 years, the number in rural areas has increased only by 4.46 percent while in semi-urban and urban areas, the number of bank offices has increased by 59.56 and 35.55 percent, respectively during the same period. This shows that rural population is not being proactively targeted by the banking sector or it is not coming forward to avail the banking services. As far as credit-deposit ratio is concerned, it is found to be fluctuating across years.

Table2: Statistics related to Commercial Banks, Uttar Pradesh, 2003-2011

Indicators	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of Bank Offices in India	8366	8413	8520	8591	8947	9353	9881	10585	11119
(a) Rural	4882	4881	4620	4617	4634	4714	4806	4953	5100
(b) Semi-Urban	1365	1368	1447	1454	1523	1621	1776	1974	2178
(c) Urban	1530	1551	1248	1277	1422	1562	1731	1963	2074
(d) Metropolitan	589	613	1205	1243	1368	1456	1568	1695	1767
Credit-Deposit Ratio (per cent)	NA	33.21	NA	46.3	44.92	42.06	NA	41.5	NA

Source: http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/02CG031111STI.pdf

BOX-4.6.1. UP has the largest number of Bank Branches

At the national level, number of offices opened all scheduled commercial banks grew from 92534 of March 2009 to 98694 by the end of March 2010, an increase of 6160 branches within one year. Of the total bank branches, 32289 are in rural areas, 20358 are in semi urban areas, 31350 are in urban areas and Metropolitan cities having 14697 branches. The largest number of bank branches are in Uttar Pradesh (11726 Nos.) followed by Maharashtra (10941 Nos.) and Andhra Pradesh (8001 Nos.).

At regional level (Table 3), the highest growth in credit-deposit ratio during 2000-01 and 2008-09 was recorded in the SR (74%), followed by the NUGP (71%), while the least growth was reported in the ER (17%). Similarly, the number of scheduled commercial banks per lakh population grew by 19 percent in the NUGP, followed by the CR (3.4%). Other regions had either no change in the

number of commercial banks during the period or registered a decline (e.g., in Southern region -2.8%); Eastern region -3.4%).

Table3: Credit Deposit Ratio and number of Commercial Banks, Uttar Pradesh, 2000-2009

Region/State	Credit Deposit Ratio		No. of scheduled commercial banks per lakh of population	
	2000-01	2008-09	2000-01	2008-09
Northern Upper Ganga Plains	37.4	63.9	5.3	6.3
Southern Upper Ganga Plains	31.8	50.7	4.7	4.7
Central Region	26.7	41.7	5.6	5.7
Southern Region	31.1	54.1	5.2	5.0
Eastern Region	24.1	28.1	4.3	4.2
Uttar Pradesh	**28.8**	**42.1**	**4.9**	**5.0**

Note: Figures for the regions represent the average value of districts in that particular region.

Figures 36 and 37 display the number of scheduled commercial banks per lakh population and the credit-deposit ratio across districts of Uttar Pradesh during 2008-09[8]. The Figure 36 shows that Gautam Buddha Nagar (14) had the largest number of scheduled commercial banks(per lakh population) in the state during 2008-09, followed by Lucknow (11), Kanpur Nagar (8) and Kanpur Dehat (8). There were 22 districts having more than state average (5.0) number of scheduled commercial banks (per lakh population). The lowest number was registered in Kushinagar (3), district, followed by Mahrajganj indicating significantly low economic activity.

The district-wise details of credit-deposit ratio (CDR) in Uttar Pradesh reveal that Muzaffarnagar recorded the highest CDR(90%), followed by Bijnor (82%),Saharanpur (73%), Hathras (72%) and Pilibhit (71%) during 2008-09. However, the lowest CDR was recorded by Mau (17.56%), followed by Jaunpur (17.63%), Sonbhadra (19.39%), Pratapgarh (19.91%) and Azamgarh (20.14%). The concentration of districts with high CDR was highest in the NUGP (Figure 37) indicating clear lead in economic activity this region.

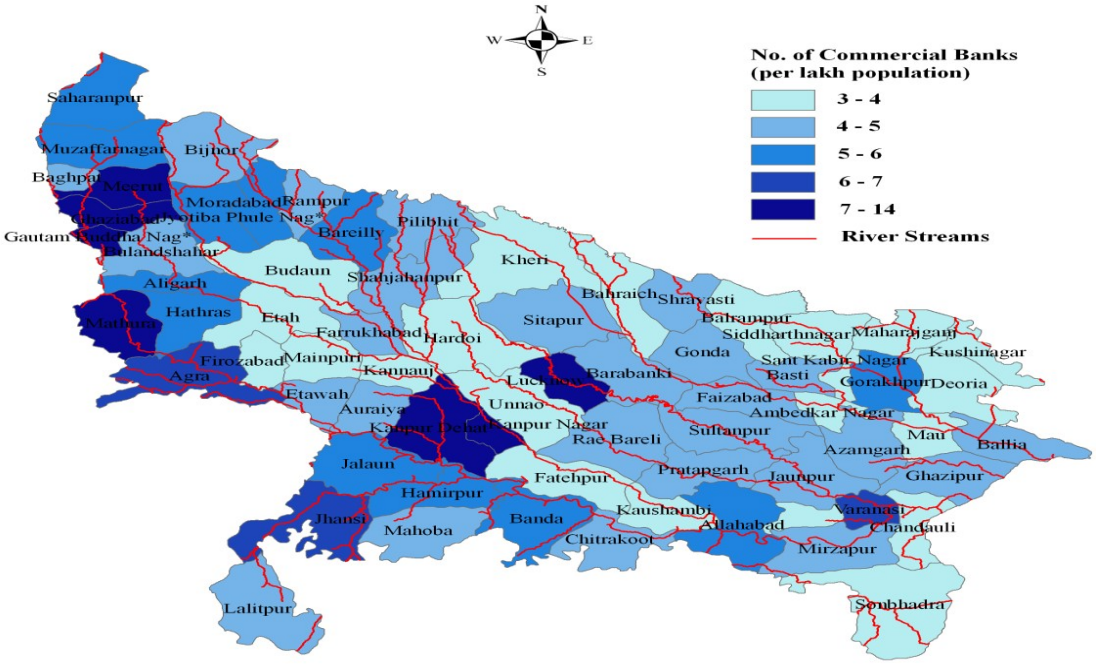


Figure 36: No. of Scheduled Commercial Banks (per lakh population) across Districts of UttarPradesh, 2008-09

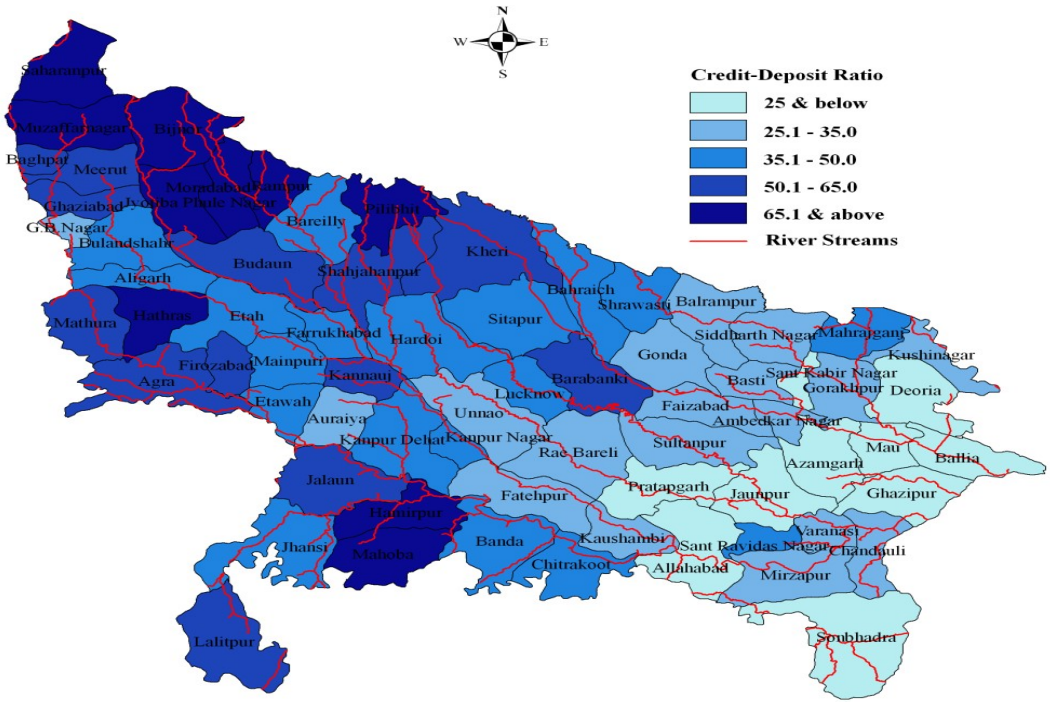


Figure 37: Credit Deposit Ratio (%) across Districts of Uttar Pradesh, 2008-09

5. Social and Health Components

5.1. Literacy

Literacy is an essential tool of self-defense in a society where social interactions include the written media. An illiterate person is significantly less equipped to defend him. Herself in court, to obtain a bank loan, to enforce his/her inheritance rights, to take advantage of new technology, to compete for secured employment, to get on the right bus, to take part in political activity- in short, to participate successfully in the modern economy and society (Dreze and Sen, 2003)[11]. Female literacy in particular, plays important role in the development of family and the younger generation. Educated and empowered women are fundamental characteristics of a developed society. Figure 38 presents the literacy rate (person, male, and female) in Uttar Pradesh during 1991-2011. An increase of more than 70 percent in literacy rate of the state was observed during the last two decades from a level of 41 percent in 1991 to 70 percent in 2011. The male literacy rate (79%) in the state was about 34 percent higher compared to female literacy rate (59%) in 2011. Nevertheless, the female literacy in the state has increased by nearly 143 percent during 1991-2011.



Figure 38: Literacy Rate (%), Uttar Pradesh, 1991-2011

At regional level, there were few differences observed in the level of literacy rate in Uttar Pradesh (Figure 39). The female literacy in the Eastern and Southern regions was relatively lower as compared to other regions in the state. The overall literacy rate was observed to be the highest in the CR (71%), while the male literacy rate was up to nearly 81% in the SR, relatively higher when compared to other regions of the state.

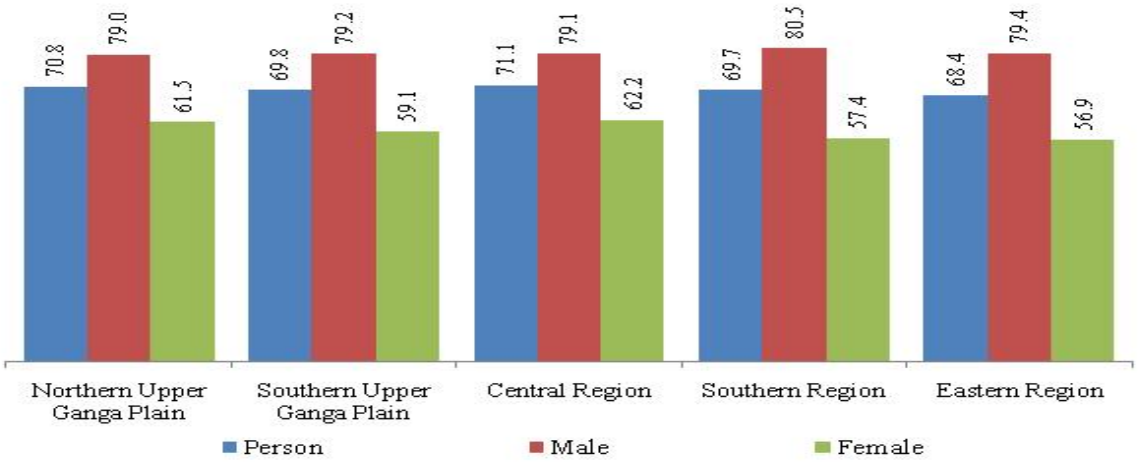


Figure 39: Literacy Rate (%) across Regions of Uttar Pradesh, 2011

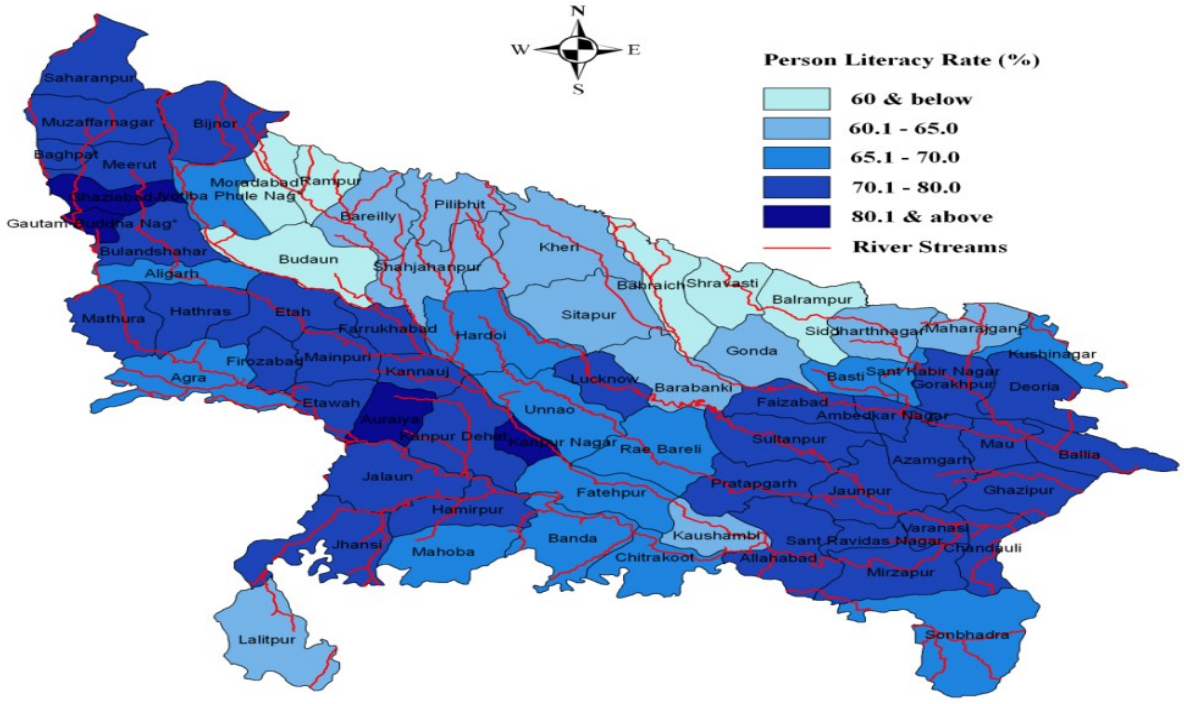


Figure 40: Literacy (Person) Rate (%) across Districts of Uttar Pradesh, 2011

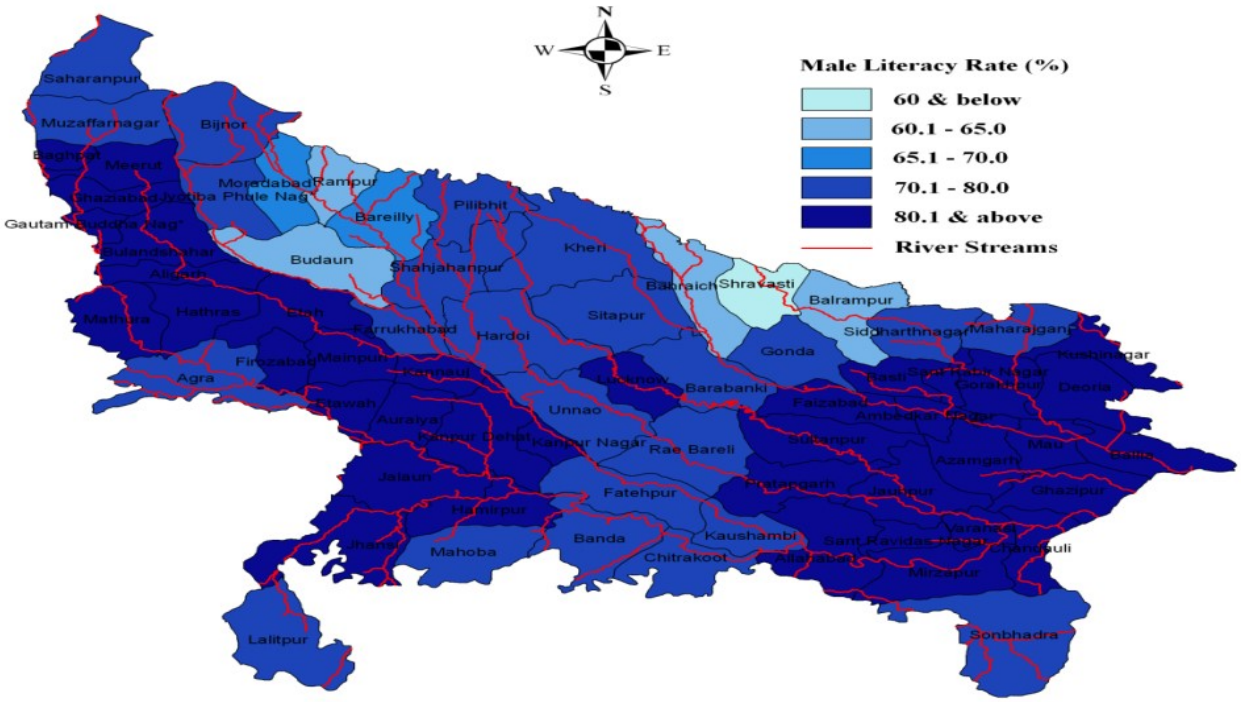


Figure 41: Literacy (Male) Rate (%) across Districts of Uttar Pradesh, 2011

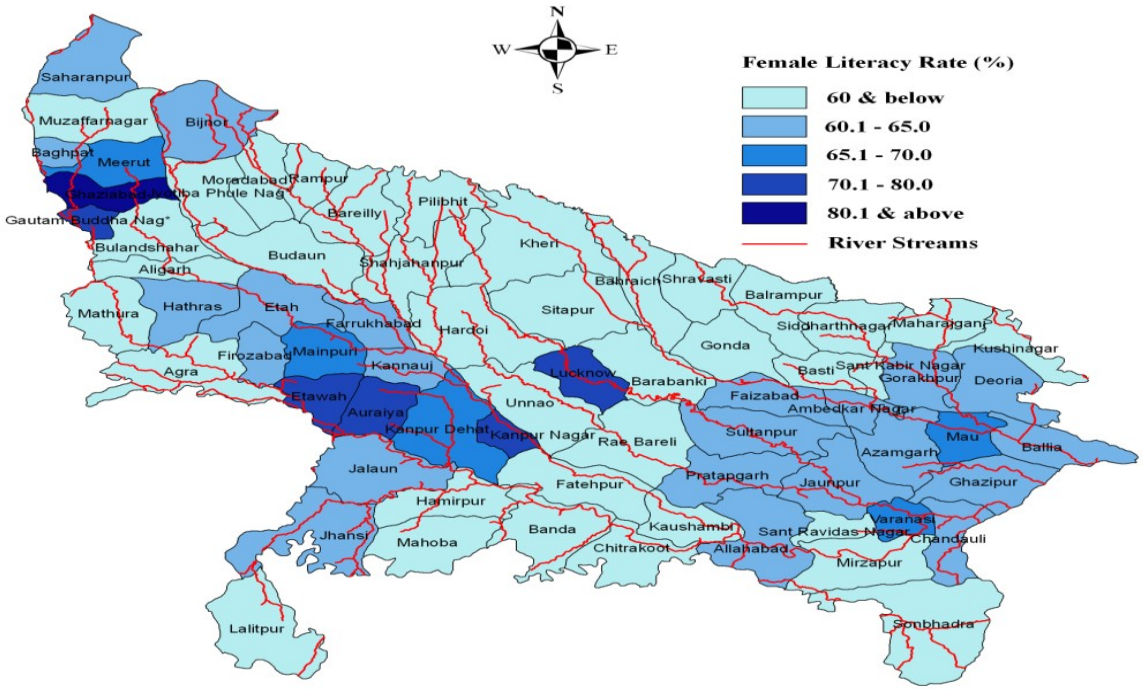


Figure 42: Literacy (Female) Rate (%) across Districts of Uttar Pradesh, 2011

Figures 40, 41, and 42 present a spatial distribution of total, male, and female literacy rates across districts of Uttar Pradesh in 2011 respectively. Figure 40 manifests that almost 70 percent and

more people in districts along Ganga river were literate in 2011, except for a few districts like Budaun, Kaushambi, Fatehpur, and Moradabad. Male literacy almost follows the same pattern. However, the levels of female literacy were not appreciable enough. Only one district in the state, i.e. Jyotiba Phule Nagar had recorded the level of female literacy higher than 80 percent. In the context of this study, it is pertinent to note that the districts along Ganga river like Moradabad, Bulandshahar, Budaun, Aligarh, Shahjahanpur, Hardoi, Unnao, Rae Bareli, Fatehpur, Kaushambi, and Mirzapur had registered female literacy well below 60 percent in 2011.

5.2. Education

Figure 43 presents the level of education in Uttar Pradesh during 1983 to 2009-10. The proportion of population above age of 6 years at different levels of education in the state at different point of time are estimated using the unit level data from the 38th, 43rd, 50th, 55th, 61st, and 66th quinquennial rounds of National Sample Survey (NSS). The Figure shows that there has been a constant growth in the middle, secondary, graduate & above levels of education in the state over the period. During 2009-10, about 15 percent population age above 6 years had their highest level of education up to primary level, 14 percent had education up to middle level, 13 percent had up to secondary level, and nearly 5 percent of population achieved graduate and higher level of education in the state. Moreover, the gross enrolment ratio, especially in Junior Basic Schools has recorded a tremendous rise from a level of 57 percent during 2002-03 to a level of 213 percent during 2008-09 (Figure 44).

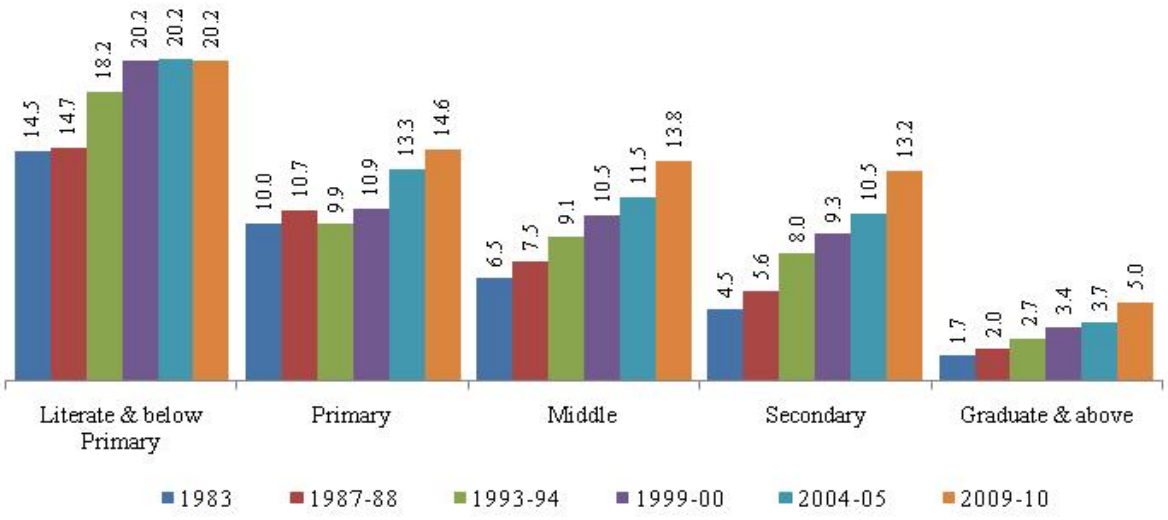


Figure 43: Proportion of population (%) by level of Education, Uttar Pradesh, 1983-2010

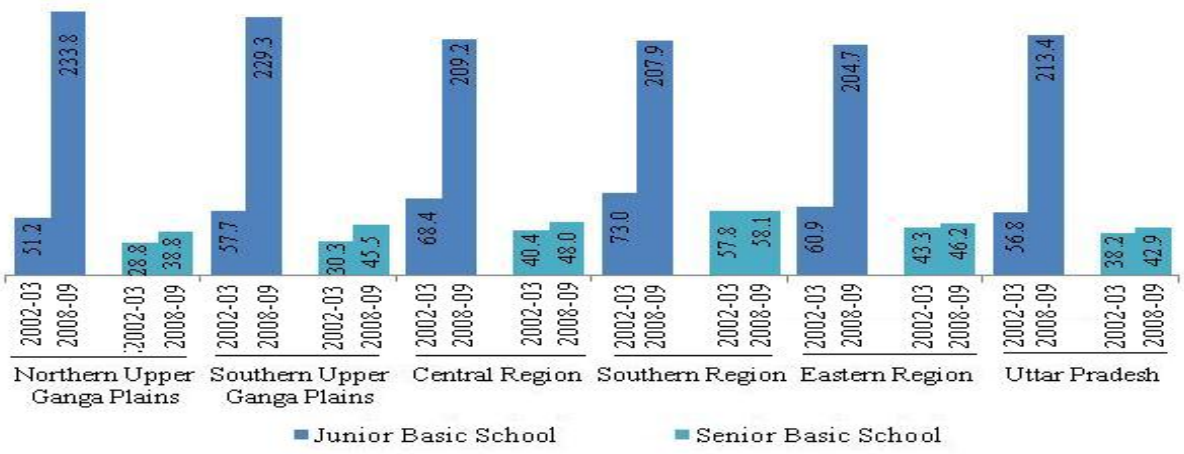


Figure 44: Gross Enrolment Ratio (%), Uttar Pradesh, 2003-2009

Almost similar trend can be observed in the gross enrolment ratio in Junior Basic Schools across different regions in the state. However, the highest increase (more than 50%) in the enrolment ratio in Senior Basic Schools was reported in the SUGP compared to the other regions.

Since, the level of education and literacy very much depend upon the education infrastructure and facilities available for the population in the state, Figures 45 and 46 present the number of schools per lakh population and the Pupil-Teacher ratio across districts of Uttar Pradesh during 2008-09[8]. The information is based on the Economics & Statistics Division, State Planning Institute, Uttar Pradesh. Both the indicators manifested in the following maps present a clear contrast, especially in the districts of the Southern and the Eastern regions. The ER and some of the districts in the CR including the capital of the state (Lucknow), demonstrated a poor educational infrastructure and facility. Although, some of these districts have relatively better literacy rate, but the quality of education becomes the real issue which needs to be taken care of. At Junior Basic Schools, the highest pupil-teacher ratio was reported in Muzaffarnagar district (142 students/teacher), followed by Bulandshahar (114), Maharajgang (110), and Baghpat (110) during 2008-09. At Senior Basic Schools, the districts with the pupil-teacher ratio more than 120 students/teacher were Bulandshahar, Kushinagar, Agra, Pratapgarh, and Lucknow in order of highest to lowest. However, at higher secondary schools, Etah was the only district in the state recording a pupil-teacher ratio of more than 100 during 2008-09.

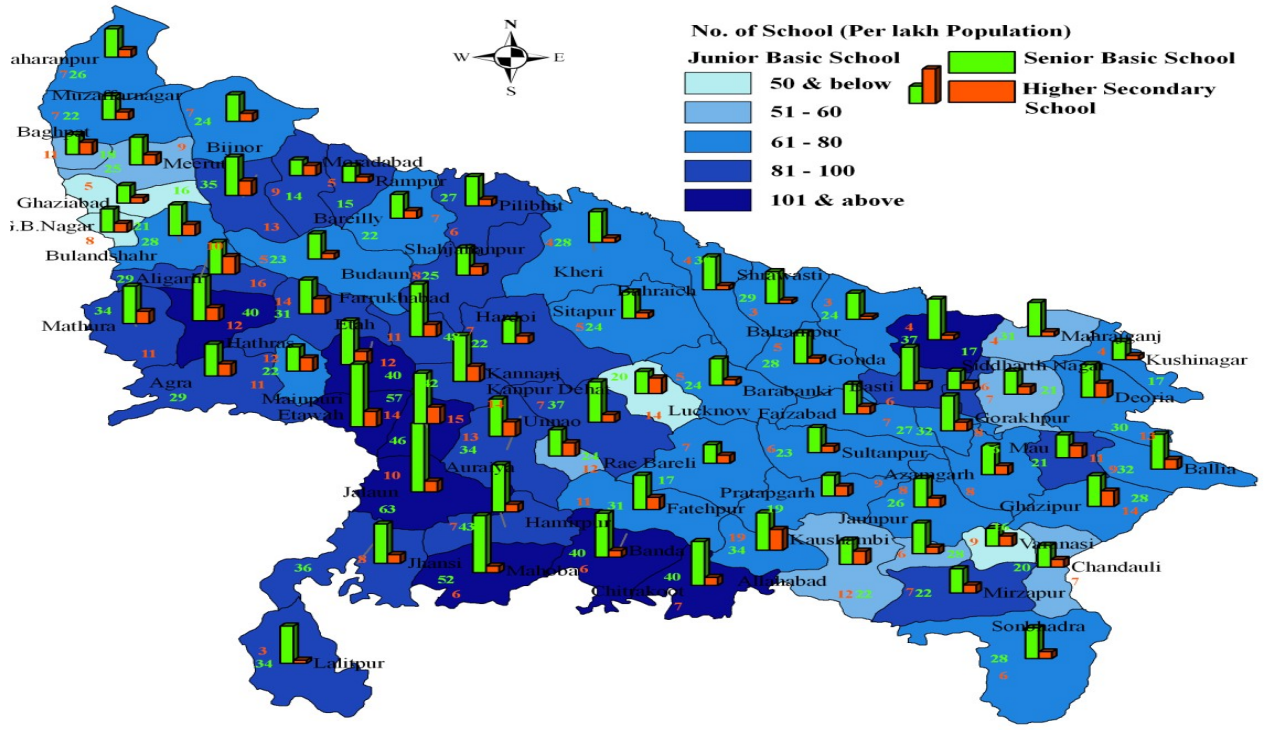


Figure 45: No. of Schools (per lakh population) across Districts of Uttar Pradesh, 2008-09

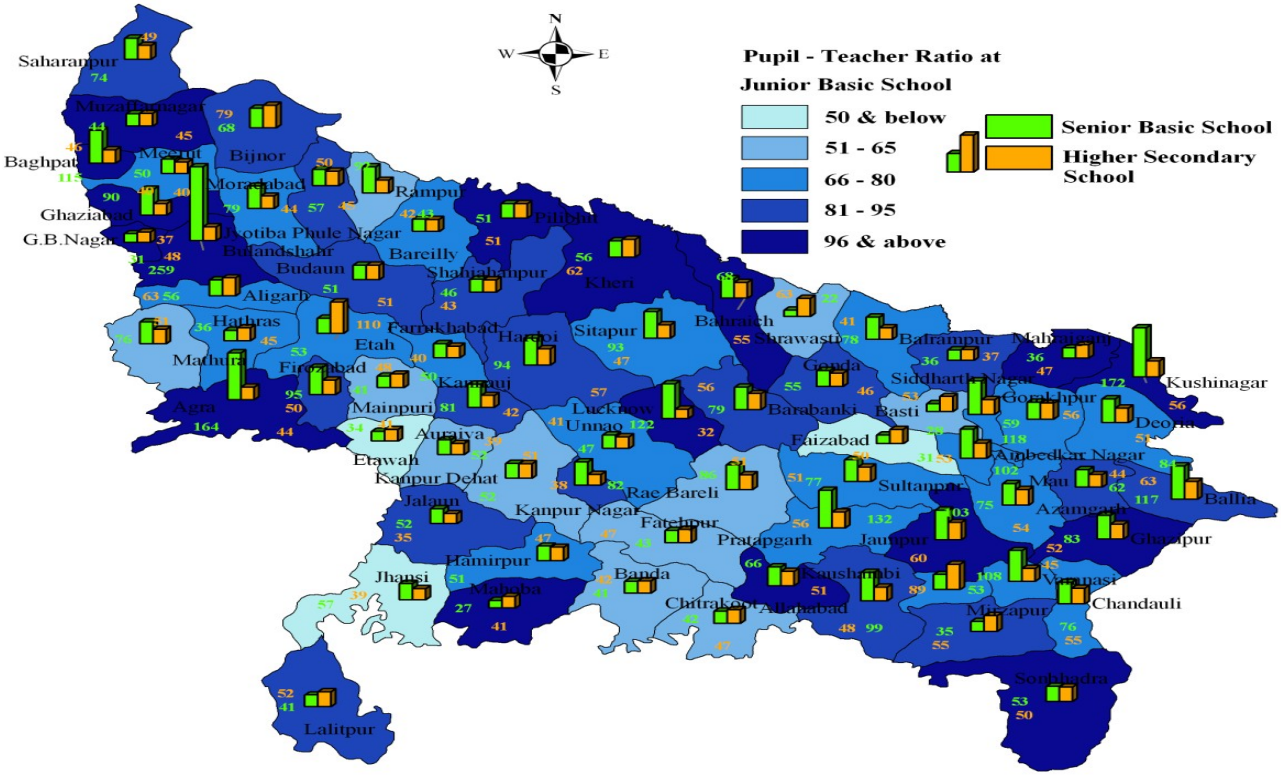


Figure 46: Pupil-Teacher Ratio across Districts of Uttar Pradesh, 2008-09

5.3. Drinking Water and Sanitation

A pure drinking water facility and the adequate management of the sanitation facility are two prominent indicators of a healthy state. District Level Household Survey (DLHS)-3[12] conducted during 2007-08 provides comprehensive information on the household infrastructure and facilities apart from other reproductive and child health indicators across all districts in India. Figure 47 presents the proportion (%) of households availing piped water facility (which includes piped into dwelling, piped to yard/plot, public tap/stand pipe/hand pump, tube well/ bore well/well covered/spring tanker, cart with small tank, and bottled water) across districts of Uttar Pradesh. The following map brings to the fore that there were higher proportion of households availing piped water (which is generally deemed clean) in districts of the NUGP and the northern part of the ER. However, some districts in the ER namely Mirzapur, Sonbhadra, Allahabad, and Sant Ravidas Nagar had 20-25 percent households which were deprived of the clean drinking water facility.

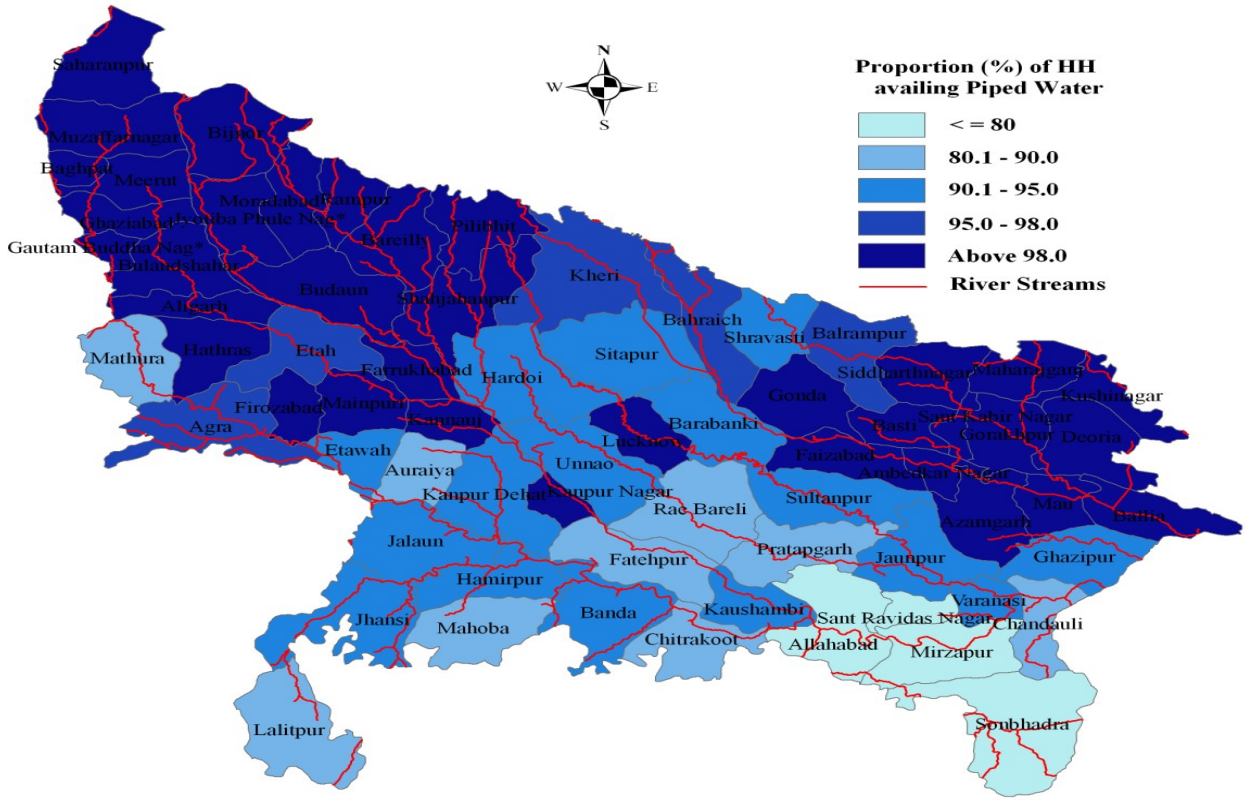


Figure 47: Households availing Piped Water (%) across Districts of Uttar Pradesh, 2007-08

BOX-5.3.1. Water Born Disorders in Aligarh, Uttar Pradesh[13]

Waterborne disorders of bacterial origin, e.g. typhoid, bacillary dysentery and diarrhea are one of the major global health problems, especially in developing countries like India. The prevalence of these diseases is largely dependent on the quality of water consumed by people. The quality of water in India is still below the WHO recommendation of zero fecal coliform/100 ml of water. A study was conducted in a suburb of Aligarh District of Uttar Pradesh by Ashraf and Yunus (1997), which surveyed a total of 1,270 persons by paying home visits and followed up for a period of one year. The study revealed that morbidity was higher in standpost group, i.e., 88.3% while in piped water group it was 51.8%. The average episode of typhoid for both sources of water was one while dysentery had 3 average episodes. The average episodes of diarrhea were 4 in stand post and 3 in piped water group. In standpost group, the majority of people (87.6%) were using unsatisfactory water as compared to 74.4% for piped water supply. The frequency of typhoid was 1.4%, bacillary dysentery 3.4% and diarrhea 7.7%. The occurrence of waterborne disorders of bacterial origin was common for typhoid in the 5-12 years age group, bacillary dysentery for the 1-5 years, and diarrhea for the 0-5 year age group. The morbidity rate in standpost group was comparatively higher, i.e., 79.6%. The frequency for the standpost group and piped water group for different diseases were, typhoid 1.1% and 0.7%, bacillary dysentery 2.7% and 2.2%, and diarrhea 6.1% and 5.1%, respectively.

Figure 48 shows the proportion of households having access to toilet facility across districts of Uttar Pradesh during 2007-08. Households having access to toilet facility here refers to the improved source of sanitation, flush not to sewer/septic/pit/twin pit, pit without slab, and dry toilet. Majority of districts in the NUGP region like Muzaffarnagar, Bijnor, Bhaghpat, Meerut, Ghaziabad, Gautam Buddha Nagar, Bareilly, Rampur etc. along with Lucknow, Kanpur Nagar, and Varanasi had reported more than 45 percent of their households having access to toilet facility. Apart from some districts in the northern part of the ER, some districts belonging to other regions which are along Ganga river such as Mainpuri, Fatehpur, Rae Bareli, Etah, Hathras had less than 25 percent of total households having access to toilet facility during 2007-08.

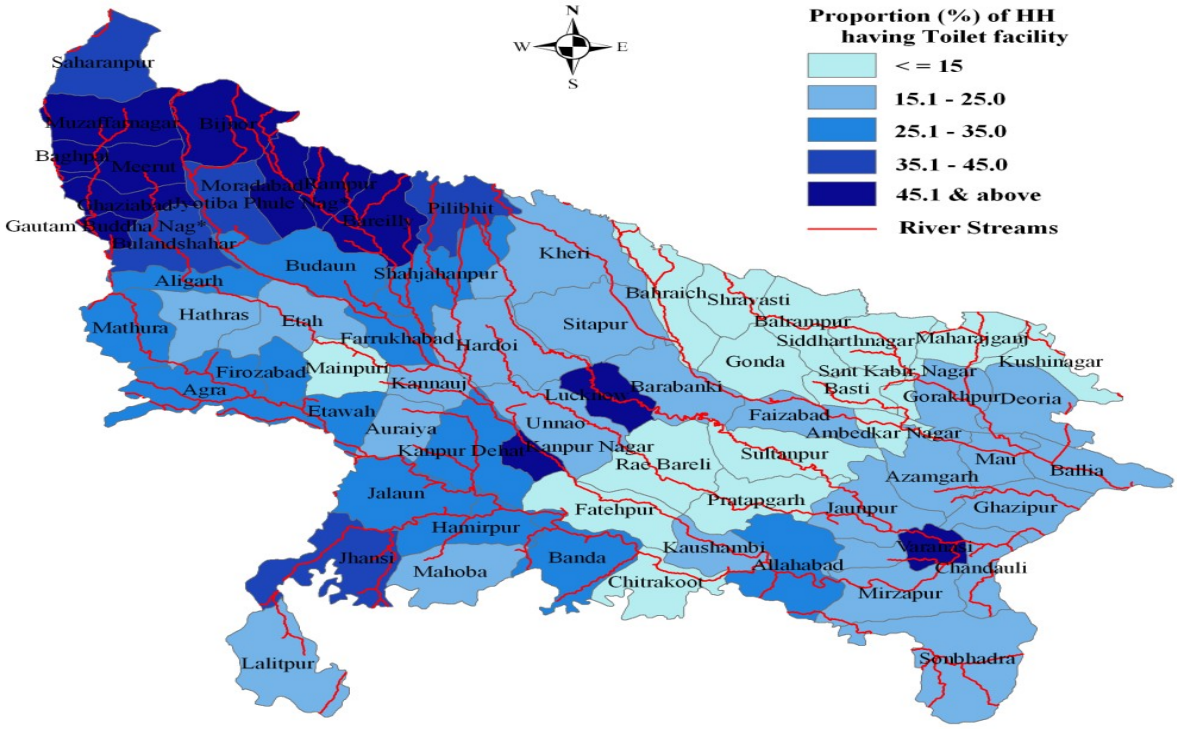


Figure 48: Households having toilet facility (%) across Districts of Uttar Pradesh, 2007-08

5.4. Health Indicators

Initial years immediately after birth are regarded as very crucial in human life, and the chances of survival to a great extent depend upon the health of the mother, health facilities available to mothers during their gestation period, immediate household environment, knowhow/ education or the precautionary measures adopted by the mother and the family members, and other post-natal services (apart from socio-psychological perspectives towards male and female child as generally seen in traditional societies) etc. Hence, the availability of a better health facility in any society or community to mother and the child can easily be perceived as important as they affect the rate of infant or child deaths and other concerned indicators. In addition, a single prominent health indicator of a community or society is the life expectancy of the people which is defined as the average number of additional years a person could expect to live if current mortality trends were to continue for rest of that person's life.

Table 3 presents selected health and mortality indicators of Uttar Pradesh during 2010-11. The data is collected from the Annual Health Survey (AHS), 2011. An infant mortality rate of 71 per 1000 live births (rural: 74; urban: 54) was recorded in Uttar Pradesh during 2010-11. Under-5 mortality rate was recorded as 94 per 1000 live births, while neo-natal and post neo-natal mortality rate were observed around 50 and 21 per 1000 live births respectively. Mortality rates were higher in rural areas as compared to urban areas, and among females as compared to males. The life expectancy at birth of a person in Uttar Pradesh was measured as 60 years in 2011.

Table3: Health and Mortality Indicators, Uttar Pradesh, 2010-11

Particulars		Total	Rural	Urban
Infant Mortality Rate				
	Total	71	74	54
	Male	69	73	53
	Female	72	75	55
Neo-natal Mortality Rate		50	53	36
Post Neo-natal Mortality Rate		21	22	18
Under-5 Mortality Rate				
	Total	94	101	68
	Male	90	95	66
	Female	99	106	69
Life Expectancy at Birth		60	-	-

Notes: 1.Infant mortality rate is calculated as annual deaths of infants (D) between birth and one year, divided by the annual number of births (B), all multiplied by 1000.

2. Neo-natal deaths: Infant dying before age of 29 days.

3. Post Neo-natal deaths: Infant dying during age of 29 days to < 1 year.

4. The under-five mortality is the probability (5q0) that a child born in a specific year or time period will die before reaching the age of five, subject to current age specific mortality rates. It is expressed as a rate per 1,000 live births.

Source: Annual Health Survey, 2011, Uttar Pradesh

The trend in infant mortality rate (IMR) of Uttar Pradesh during 1971-2009[14] shows a clear declining pattern (Figure 49). During 1971-79, the IMR of the state was advancing with uncertain highs and lows indicating no stable medical control on the mishaps, though since 1984, after firm resolution at the global level towards better reproductive and child health facilities, the IMR seems to have declined rapidly and at a rather constant pace. In the 1990s, due to possible control in the deaths of infants in post-natal period, the IMR reduced but shows a stalling trend, possibly due to lack of control on pre-natal infant deaths. However, since 2005 there is an indication of a slight decline in the mortality rate further. The IMR seems prominent in rural areas which is a manifestation of poor health facilities.

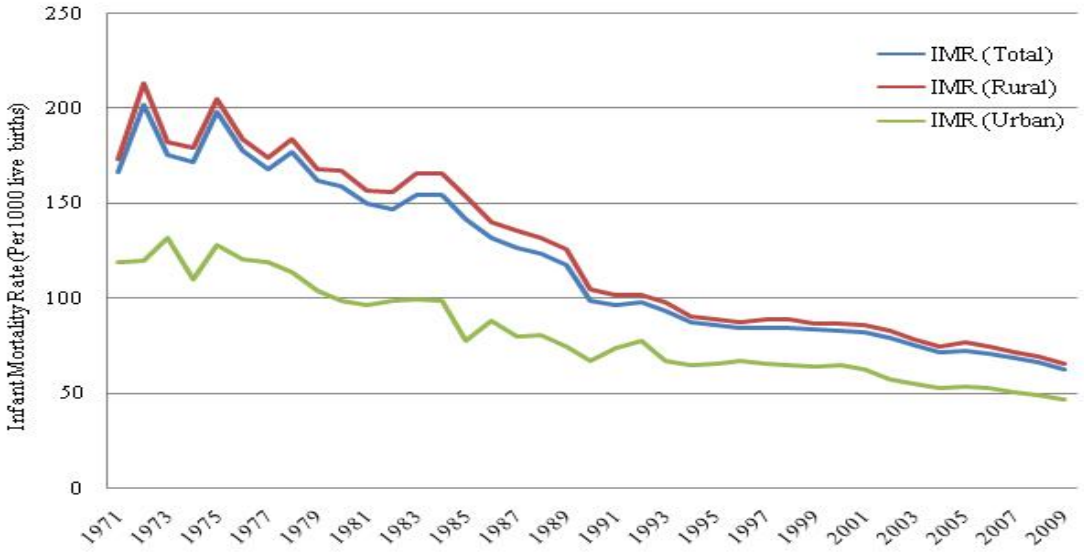


Figure 49: Infant Mortality Rate (per 1000 live births), Uttar Pradesh, 1971-2009

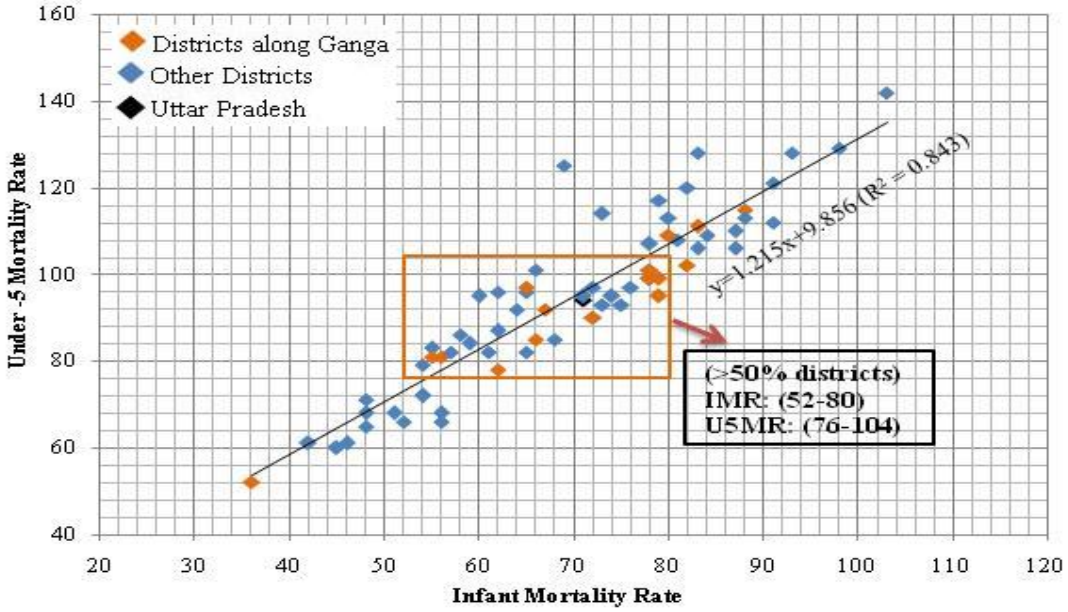


Figure 50: Infant Mortality and Under-5 Mortality Rate (per 1000 live births) across Districts of Uttar Pradesh, 2010-11

Figure 50 displays relationship between IMR and the U5MRwhich is found to be highly correlated. It shows that more than half of the districts in Uttar Pradesh had IMR ranging between 52 and 80 per 1000 live births, and U5MR ranging between 76 and 104 per 1000 live births.

Figure 51 and 52 are based on the information collected from the District Level Household Survey (DLHS)-3[12] (2007-08), and present the proportion of last or last-but-one-child born after January 1,

2004 (born to women aged 15-49) having had suffered from Diarrhea and Acute Respiratory Infection (ARI) in the last two weeks prior to the survey respectively across districts of Uttar Pradesh. The highest proportion (33.8%) was recorded in Kheri (SUGP), and 80.9 percent of them were given treatment for diarrhea. On the other hand in Kanpur Nagar, about 3.3 percent of children of the same cohort had diarrhea and 49.7 percent were provided treatment. The prevalence of ARI among children varies from 1 percent in Ballia to 30 percent in Kheri. On average, treatment for ARI is more common (84%) than the treatment for diarrhoea. The higher prevalence of diarrhea and ARI in the western part of the state compared to the eastern part may possibly be attributed to, among others, difference in the levels of awareness towards the concerned illness, hygiene practices, among children and environment sanitation levels.

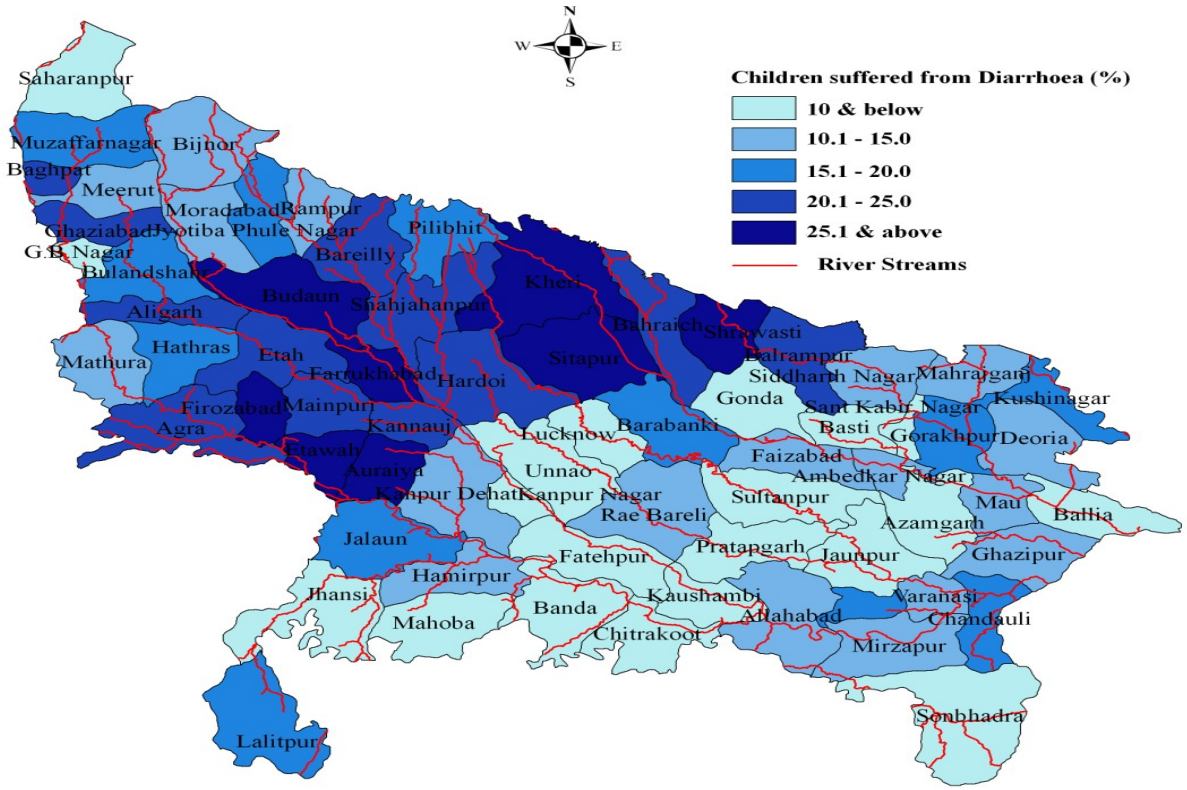


Figure 51: Children suffered from Diarrhoea (%) across Districts of Uttar Pradesh, 2007-08

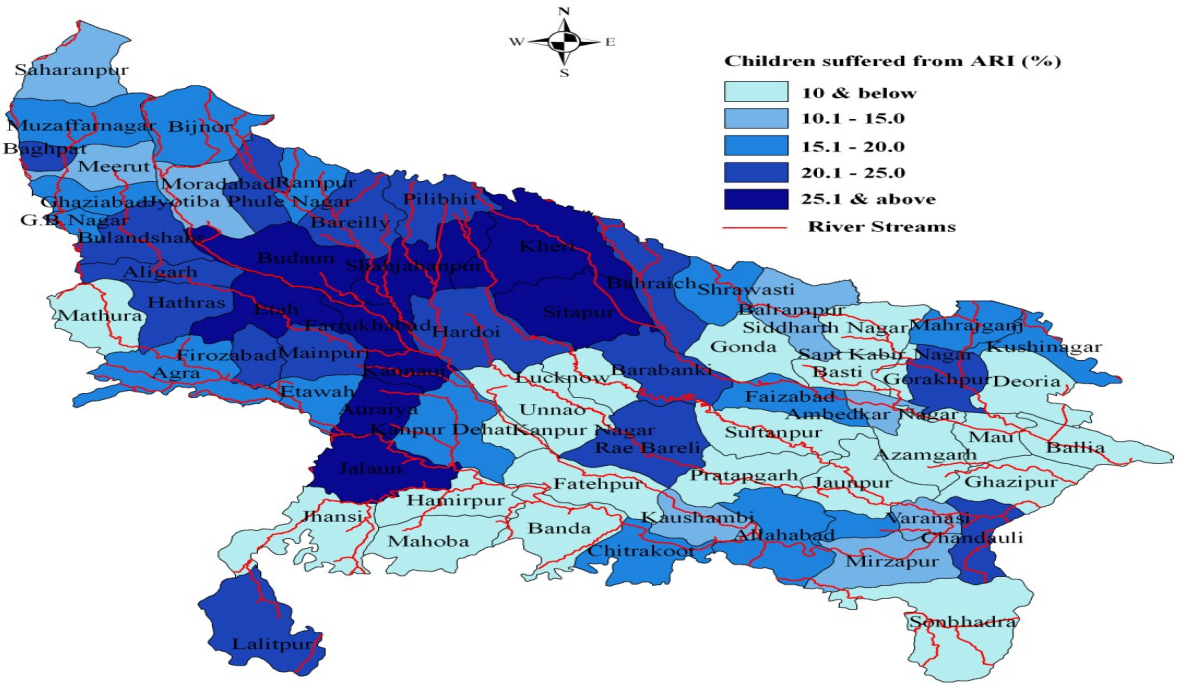


Figure 52: **Children suffered from Acute Respiratory Infection (%) across Districts of Uttar Pradesh, 2007-08**

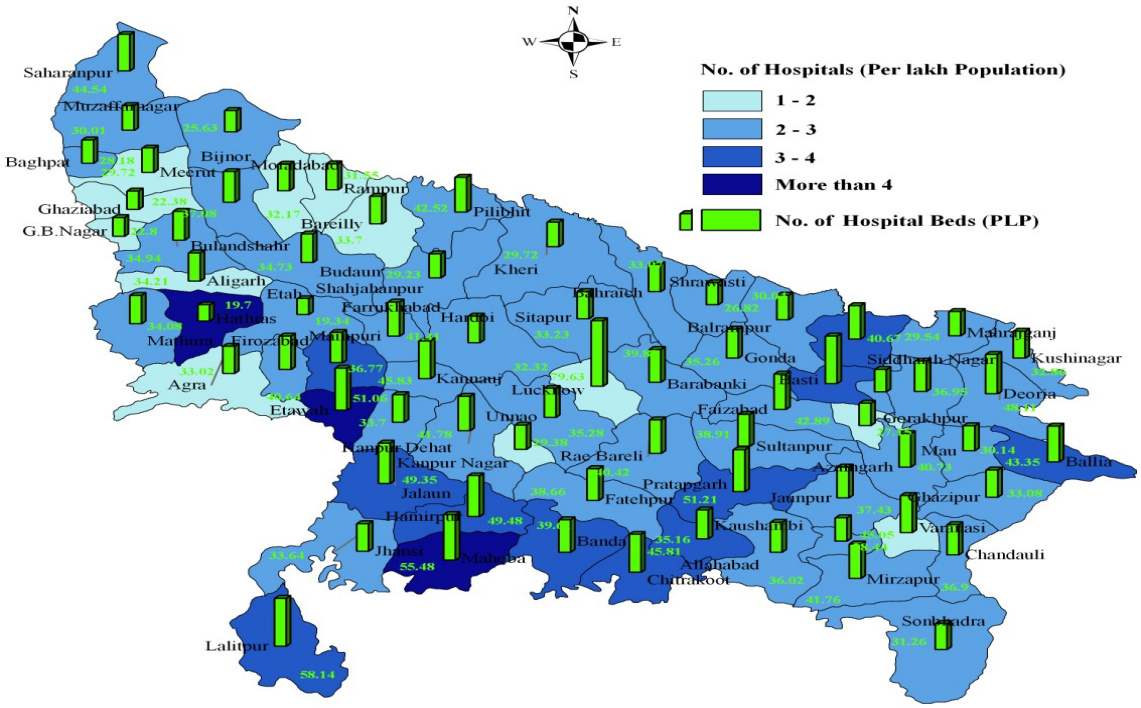


Figure 53: **No. of Allopathic Hospitals and Hospital Beds (per lakh population) across Districts of Uttar Pradesh, 2008-09**

Figure 53 presents the general indicator of public health infrastructure and facilities, i.e. the number of Allopathic hospitals and hospital beds (per lakh population) across districts of Uttar Pradesh during 2007-08. The districts like Hathras, Etawah, and Mahoba had more than 4 Allopathic hospitals per lakh population during 2008-09. However, with 20 hospital beds per lakh population, the number is not found to be adequate) in Hathras. The pattern shows that the lesser number of hospitals was compensated by the increased number of hospital beds. For instance, in Lucknow the number of hospitals per lakh population was very less but there was a provision of about 80 hospital beds per lakh population. Similarly, Varanasi and Kanpur Nagar seem to have bigger hospitals with more numbers of hospital beds. These bigger cities also cater to the patients from nearby districts of the state, and even from neighbouring states.

6. Population Projections for Various Regions of Uttar Pradesh

Here projections are made by assuming past trends will continue to operate in future (policy parameters are not taking into account). By using the population of Uttar Pradesh from 1991-2011 and distributing it in five regions, namely NUGP, SUGP, CR, SR and ER, following steps are taken to calculate population projection:

Compound Annual Growth Rate (CAGR) of population can be calculated by using the formula:

CAGR or R = $[(P_n/P_o)^{1/n}-1] \times 100$, where

P_o = Population in the base year (1991)

P_n= Population in the current year (2011)

n = Number of intermediary Years

For Example, P_o = 132,061,653 (Population in 1991)

P_n= 199,581,477 (Population in 2011)

n = 30 years, so CAGR (1991-2011) of total population in Uttar Pradesh = 1.39

Starting with the population of the various regions of the state of Uttar Pradesh as per the estimates of the three consecutive years i.e., 1991, 2001, and 2011 and assuming that the trends shall follow the linear trend, the projections can be made for both the years i.e., 2025 and 2050. Table 4 provides the relevant information in this regard.

Table 4: Region-wise Population (in Millions) in Uttar Pradesh (1991-2011)

State/?Regions	Census 1991			Census 2001			Census 2011		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Uttar Pradesh	132.06	106.09	25.97	166.05	131.54	34.51	199.58	155.11	44.47
Northern Upper Ganga Plain (NUGP)	18.38	13.42	4.96	25.34	16.98	8.36	31.32	19.34	11.98
Southern Upper Ganga Plain (SUGP)	32.46	24.46	8.00	38.90	29.68	9.22	46.93	35.17	11.77
Central Region (CR)	21.77	16.29	5.48	26.97	19.74	7.23	31.93	23.14	8.79
Southern Region (SR)	6.73	5.30	1.44	8.23	6.38	1.85	9.66	7.46	2.20
Eastern Region (ER)	52.72	46.63	6.10	66.62	58.77	7.85	79.74	70.01	9.74

Based upon the statistics given in Table 4, the CAGR for the period has been calculated and presented in Table 5. As could be discerned from the calculated CAGR, the population growth rate has been maximum for the NUGP where the urban population has been growing at the fastest rate while the growth of rural population has been growing, more or less, at the same rate at which it is growing for the state. The second highest growth rate was found for the CR and if existing trends are any indication, these two regions may expand faster than other regions of UP and are likely to post highest growth rate of urban population which implies far more increase in the domestic and industrial demand for the water. This may put further stress on the ground and surface water which have already started showing signs of fatigue. Interestingly, ER has recorded maximum growth in CAGR in regard of the rural areas.

Table 5: CAGR of Uttar Pradesh Population (1991-2011)

State / Regions	Total	Rural	Urban
Uttar Pradesh	1.39	1.27	1.81
Northern Upper Ganga Plain (NUGP)	1.79	1.23	2.98
Southern Upper Ganga Plain (SUGP)	1.24	1.22	1.29
Central Region (CR)	1.28	1.18	1.59
Southern Region (SR)	1.21	1.15	1.43
Eastern Region (ER)	1.39	1.36	1.57

By using the formula $P_{n+1}= P_n (1+R/100)^n$, the population of the various regions of Uttar Pradesh for 2025 and 2050 can be projected and the relevant information is summed up in Table 6.

Table 6: Region-wise Projected Population (in Millions) in Uttar Pradesh

State / Regions	2025			2050		
	Total	Rural	Urban	Total	Rural	Urban
Uttar Pradesh	243.15	185.23	57.92	343.09	246.47	96.62
Northern Upper Ganga Plain	41.01	22.94	18.07	55.79	31.69	24.10
Southern Upper Ganga Plain	55.74	41.66	14.09	93.56	56.55	37.01
Central Region	38.21	27.25	10.96	51.60	37.09	14.51
Southern Region	11.44	8.76	2.68	15.84	11.77	4.06
Eastern Region	96.74	84.63	12.11	126.30	109.36	16.94

Table 6 brings to the fore that while the NUGP and CR shall keep on expanding, the ER may register an impressive growth of population especially in rural areas. All these projections have serious implications for the demand for both ground and surface water whose supply is already under heavy stress.

7. Demand for and Supply of Water: Projections

The issue of demand for and supply of water for various purposes along Ganges and its extensive network of canals and major tributaries, does have a great relevance in terms of current as well as future needs, given the fact that quantitative supply and water quality problems are escalating

and could severely impair the economic development, environment, and wellbeing of all forms of life existing in its basin. It may be mentioned here that while the demand for water for all uses is increasing exponentially, there does not appear to be any evidence of any increase in supply. The ground realities, in fact, are the other way round due to uncertain rains and radically altered climatic conditions. An indication of what is going to happen in the Gangetic plains in coming times with yawning gap between demand and supply of water can also be discerned from the incidences of unsettling differences between riparian states over Cauvery water, Yamuna water, etc. at the national level and between India and Pakistan, and India and Bangladesh at the sub-continent level. It is, therefore, important that the water resources in the state are managed in such a way that while they meet all the legitimate needs of the current population, they may remain available, in terms of acceptable quantity and quality, for the use of ever expanding future population as well. The first step towards the management of water resources is the assessment of supply of and demand for water in short and long runs which could be done by making projections, based upon realistic assumptions, with regard to both. The second logical step is the matching up of the supply and demand, in the short and long run, through supply and demand side management. While the supply side management involves technical and other interventions for the scientific development and growth of water resources, the demand side management accounts for the socio-economic-cultural dimensions for the appropriate allocation of water among various competing uses. The third step would be the setting up of a powerful monitoring mechanism for the integrated management of water resources so as to keep a check on the use, availability and quality of water, keeping in view the current and future requirements. The case for water is very special in the sense that this is a resource 'where the action of any one economic agent increases the social costs of resource use for the entire community and the individual user lacks the incentive to limit his/her level of use' (Kale 2010 p.47). Being part of the common property resources, it has to be managed very thoughtfully and efficiently.

7.1. Demand for Water

Before examining the demand for water for the state of Uttar Pradesh, it would be interesting to find out the current water usage in the world as well as in India. As could be seen in Table 7, most of the demand for water comes from agricultural sector, distantly followed by demand for water for the industrial activities and domestic use.

Table7: Current Water Usage

Usage (%)	World	Europe	Africa	India
Agriculture	69	33	88	83
Industry	23	54	5	12
Domestic	8	13	7	5

Source: Hegde, Narayan C, (2012) 'Water Scarcity and Security in India, Downloaded on Aug. 23, 2012 from the website: http://www.indiawaterportal.org/node/23240

In the context of the state of Uttar Pradesh, the demand for Ganges' water arises out of:

(i) Domestic and municipal usages;

(ii) As input in agriculture, industry (including power generation) and the tertiary sector;

(iii) For cultural festivals and religious rites performance, including religious congregations,
(iv) For the evacuation of effluents (sanitation, removing industrial wastes etc.).
(v) Navigation and recreation, and
(vi) Environmental flow/ecologically acceptable flow regime needs

While all the above uses compete with each other, the major concern arises out of conflict between irrigation versus ecological flow versus flow needed for performance of the religious rites. Given the reverence for the water River Ganga, which is believed to have descended from heaven in order to enable human beings to get rid of their sins and attain 'MOKSHA' (salvation), maintaining an appropriate depth and flow from its source to when it finally meets the sea, has become a major focus of attention. Similarly, the demand for water for maintaining ecological flow in the river, which is estimated to be at least 1/3 of the available water volume, is equally important so as to enable it to carry out many more functions efficiently besides providing water for agriculture, drinking and other uses. In fact, the demands from all these usages are increasing at much faster rate and compete with each other due to rapid population growth, urbanization and industrialization. The major demand for water comes from the agricultural sector. On an average, while the global consumption of water for agricultural use stands around 71% of the total water use, the corresponding figures for India and Uttar Pradesh are 89% and 93% respectively (Kumar 2010). This magnitude of water for irrigation in the state of Uttar Pradesh, is supplied by an extensive network of around 73,637 km canals, 27,600 state owned tube-wells, 17,768 deep tube-wells and 3.96 million shallow tube-wells owned by individual farmers (Jal Sandesh 2010). In the entire area around 13.08 million ha that these systems irrigate, the share of canals stands at 18% and that of state tube-wells at 3%. Private tube-wells, on the other hand, provide water to around 70.2% of the irrigated area (Statistical Diary, Uttar Pradesh 2009).

A projection for the demand for water for different states by GOI, as shown in Table 8 reveals that the demand for water in UP and Uttaranchal is highest among all the states. Although these twin states also have perennial snow-fed sources of river water, yet any water deficit arising out of population expansion and resultant increase in the demand for water for growing crops, drinking and domestic, power (thermal and hydro), industrial and other uses, may hit these two states most.

Table 8: State-wise Projected Water Requirements in India (2025 and 2050) [Billion Cubic Metre (BCM)]

State / UTs	2025	2050
Andhra Pradesh	78.5	109.8
Arunachal Pradesh	2.1	12.6
Assam	24.1	50.1
Bihar and Jharkhand	64.3	106.6
Goa	0.8	0.9
Gujarat	46.0	56.8
Haryana	31.8	31.6
Himachal Pradesh	6.0	6.7

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State / UTs	2025	2050
Jammu & Kashmir	9.1	15.5
Karnataka	42.7	58.8
Kerala	15.6	30.9
Madhya Pradesh and Chhattisgarh	67.6	113.6
Maharashtra	74.0	101.5
Manipur	1.7	5.1
Meghalaya	1.5	2.2
Mizoram	0.6	1.2
Nagaland	1.6	6.1
Orissa	32.8	49.1
Punjab	48.8	47.5
Rajasthan	54.8	59.6
Sikkim	0.5	0.8
Tamil Nadu	51.6	61.7
Tripura	2.0	6.9
Uttar Pradesh and Uttaranchal	137.0	171.6
West Bengal	44.5	66.4
UTs	2.5	4.0

http://www.indiastat.com/table/agriculture/2/waterdemandrequirement/450270/442946/data.aspx

Source : Lok Sabha Unstarred Question No. 5283, dated on 05.05.2008.

7.2 Supply of Water:

The sources of water supply comprise:

A. Ganges and its tributaries,

B. Ground Water (with uneven spatial distribution)

C. Return Flows from: (i) Irrigation, (ii) Water Supply, and (iii) Industries

D. Harvested Rain Water

Of all the above, while reliable estimates are available for (A) and (B), there are practical difficulties in estimating (C) and (D). However, Planning Commission has prepared projected estimates calculating the ratio of the total return flows to total availability of water (including returns) at 26% for 2050, although there could be serious doubts about the quality of the water received from such return flows (especially industrial and domestic consumption) and whether such water, in any case, be fit for human consumption/irrigation. Before proceeding ahead, it may be relevant to point out that one of the basic characteristics of water supply in India, from any source, is that water for all uses does not reflect even the cost of recovery and is, in a way, highly subsidized or free essentially because of the prevalence of a 'rights-based approach'. This has resulted in indiscriminate use of water, whether river or ground water, without much caring for its consequences. For instance, the average water use efficiency of irrigation projects is assessed to be only of the order of 25-35%' (CWC)due to seepage, evaporation, leakages in structures, poor water management in the distribution network, and excessive use of the water largely due to its free nature. The Planning Commission has also reported 30-40 per cent losses in case of urban water supply (http://planningcommission.nic.in/plans/mta/midterm/english-pdf/chapter-06.pdf).

It may be mentioned here that while there is no charge on the ground water extraction, irrigation water and domestic supply tariffs are too less to even cover the operation and maintenance costs (O&M). This results in total absence of motivation for even a small improvement in water-use efficiency which otherwise could have released significant amount of water for other competing uses. Similarly, ground water which at present meets most of the demand for water stands over-exploited/extracted in both the rural and urban areas, resulting into significant decline in the watertable, mostly affecting western U.P. Besides, widely reported contamination/pollution hazards due to percolation of industrial effluents, municipal solid wastes, pesticides and herbicides as well as the widely reported presence of contamination caused by the alarming quantities of arsenic, nitrate, and fluoride in groundwater from various areas in the state have also emerged as major threats to groundater, at least for drinking water purposes (Bhargava and Dutta 2010). Despite the great significance of the ground water as it provides for 75% of the irrigation supplies, 80-90% of the drinking water and almost all the industrial needs, it is most poorly managed, unregulated and over-exploited water resource in the state of Uttar Pradesh (Sinha 2010). It may be mentioned that more than 40% of private minor irrigation tube wells in the country i.e. about 41 lakhs are alone located in the state, leading to indiscriminate extraction of huge quantity of groundwater (Sinha 2010). Given the heavy dependence on the ground water for irrigation, drinking water and industrial uses, it would probably be difficult for the natural cycle to adequately replenish the depleting aquifers. This overexploitation may also put heavy stress on the aquifers. It may be mentioned here that the gross ground water draft for irrigation alone has increased by 20.58% between 1991 and 2004. It may be further stated that out of total 820 blocks in the state the number of over-exploited/critical blocks has also significantly increased from 22 in the year 2000 to 50 blocks in the year 2004 and further boubling to 105 blocks in 2008. Similarly, the number of semi-critical blocks increased from 53 in 2000 to 88 in 2004 and to 109 by 2008 (Sinha 2010). It implies that there is a steep decline in the number of safe blocks in the state, in terms of groundwater exploitation and the rate of decline israther high.

7. 3. Demand for Water and Supply of Water: Projections

The projections for demand and supply of water for various purposes/sources, have been made by the Planning Commission and given the sound methodology adopted for doing the same, these projections can be taken with a fair degree of confidence. These projections are made on the basis of the figures adopted by National Commission on Integrated Water Resources Development, India (1999) regarding the per person water requirement for the rural and urban consumers. For rural areas, 70 lpcd and 150 lpcd have been recommended for the year 2025 and 2050, while for urban areas these estimates have been put at 165 lpcd and 220 lpcd respectively. The net availability of the water through natural flow was estimated to be 250 BCM by 2050 out of which if 66 BCM, 15 BCM and 30 BCM are subtracted for being part of the upstream reserves, downstream reserves and unusable spill, the net availability comes down to 139 BCM. The final projections for demand for and supply of water are summed up in Table 9.

Table 9: Projected Demand for and Supply of Water for Uttar Pradesh (BCM/Yr) -Year 2050

DEMAND IN WITHDRAWAL TERMS	2025	2050
A. Domestic Water Demand (10% of storage)	8.22	21.25
B. Consumptive Use of power (Based on UPSEB Projections)		
Hydro Power (Ultimate Storage 28.36 BCM) assuming10% of storage	1.5	2.83
Thermal Power (50000 MW by 2025 and 125000 MWby 2050)@ 3.92 million m3 per 100MW per Year	1.96	4.9
C. Industrial Water Requirement (withdrawals)	4.82	7.8
D. Agricultural (Irrigation Demand)	(-)	147.6
Aggregate		184.38
NET DEMAND IN CONSUMPTIVE TERMS	**2025**	**2050**
A. Domestic Water Demand at 50% of withdrawals	4.11	10.625
B. Power Demand	3.46	7.73
C. Industrial Demand at 50% of withdrawals	2.41	3.9
D. Agricultural Demand	(-)	98.6
Aggregate	**(-)**	**120.855**
WATER SUPPLY	**2025**	**2050**
A. From irrigation at 70 % of imbalance [.7 * (147.60-98.6)]	-	34.3
B. Water Supply	-	10.95
C. Industries	-	4.05
D. Total Returns	-	49.3
E. Approximate Natural availability to Uttar Pradesh	-	139
F. Total Availability Including returns	-	188.3

Source: Water Resources: Management and Development, UP Development Report, Vol. II, Chapter 11, Planning Commission, Government of India, P. 293.

As can be discerned from Table 9, there would still be some surplus water even by 2050 provided all the assumptions of the projections hold true. The projections, nevertheless, do not account for minimum required water flow in the river for maintaining river regime including both spatial and temporal patterns of river flow (Iyer2005), freshwater-dependent ecosystems/downstream obligations, besides, maintaining a minimum flow, at least at the important locations, throughout the year for enabling the people to perform the religious rites/congregations etc. In fact, maintenance of at least a basic minimum water flow towards the above purpose is extremely important as it preserves the self-purification characteristics of the river, sustains 'aquatic life and vegetation, recharges groundwater, supports livelihoods, facilitates navigation, preserves estuarine conditions, prevents incursion of salinity, and enables the river to play its role in the cultural and spiritual lives of the people' (Iyer2005). Given these important functions of the river, the demand for water for other competing uses is over and above the required volume of environmental flow. Even if it is assumed that the water flow maintained for meeting ecological needs could also be sufficient for the people to meet their cultural and religious rites performance, the total availability of the river water for meeting other demands, shall substantially contract, putting further stress on the already heavily stressed ground water resources. This may further worsen the already deteriorating situation.

8. Conclusions and Policy Implications

8.1 Conclusions

Following conclusions emerge from the preceding discussion:

- Uttar Pradesh continues to be the most populous state in the country with almost 200 million people living here. The state holds 16.49 percent population of India, as per census 2011.
- During the recent decade 2001-11, the maximum decline in decadal growth rate of population was reported by CR (7 percentage point), followed by SR (5.9 percentage point), ER (5.7 percentage point), and SUGP (5.1 percentage point), while NUGP (3.7 percentage point) reported the lowest decline.
- ER accounted with the highest birth and the death rates (27 and 10 per 1000 population respectively), while the CR reported the lowest birth rate of 23 per 1000 population with the death rate of 8 per 1000 population.
- ER accounted with the highest birth and the death rates (27 and 10 per 1000 population respectively), while CR reported the lowest birth rate of 23 per 1000 population with the death rate of 8 per 1000 population.
- ER (comprises the most numbers of districts in the state), homes about 45 percent rural and 21.9 percent urban population of the state with the lowest level of urbanization.
- NUGP has reported highest population density in the state since 1991 (736 persons/sq. km.) to 2011 (1188 persons/sq. km.), while SR has always been sparsely populated (226 in 1991 and 326 in 2011).
- During 2009-10, Uttar Pradesh reported almost 37 percent of its population below the age of 15 years, 58 percent between 15-64 years, and 5 percent above 64 years. Males dominate (marginally) in the population up to 19 years of age, while in the age group 20-64 years the proportion of female population appeared to be more.
- There were 13 districts in the state with sex ratio of 951 females per 1000 males or more in census 2011, followed by 10 districts with sex ratio ranging between 911 and 950, 14 districts in the range 891 to 910, 17 districts in the range 871 to 890, and 17 districts in the range 870 females per 1000 males and below.
- Majority of the SC/ST population lives in CR and SR. Population of Hindus was proportionally highest in SR (94.8%) and lowest in NUGP (68.4%).

- The highest overall dependency ratio was reported in ER (79%), followed by SUGP (74%). However, highest aged dependency ratio was observed in SR (11%).

- The highest aged dependency ratio was observed in Mahoba district (23%), followed by Kannauj (15%), Fatehpur (15%), and Chitrakoot (14%). In NUGP, the dependency ratio among the districts along Ganga River was observed to be more than 70 percent during 2009-10.

- GSDP of Uttar Pradesh grew with a CAGR of 4.83 percent during 1999-2008. The average GDDP in the CR appears to have witnessed the highest annual growth rate of 5.8 percent among all the regions of the state during the same period, followed by NUGP (5.05%). This implies that there exists a regional variation in the growth of GDDP which creates inter-region economic disparities.

- ER and NUGP have contributed maximum share to the primary sector of the state economy. Although ER has also contributed to the secondary sector in significant amount, NUGP accounts for the maximum share to the secondary sector in GSDP (marginally higher than that of the ER). Moreover, maximum share in the tertiary sector of the GSDP was recorded in ER (30% during 2007-08), followed by SUGP and NUGP.

- The proportion of households which were self-employed in agricultural activities declined from 56 percent in 1983 to 48 percent in 2009-10. Similarly, the proportion of households which were involved as agricultural labourers also declined from 18 percent in 1983 to 11 percent in 2009-10. Due to increasing opportunities in non-agricultural activities, especially after the advent of the MGNREGA, the share of non-agricultural labourers has increased almost two times between 2004-05 and 2009-10 in rural Uttar Pradesh. This is a clear indication that non-farm activities have expended in the State during the period 1983 to 2009-10. Expansion of non-farm activities in the state reduces the workforce pressure on agriculture but at the same time put more pressure on urban basic amenities.

- The credit-deposit ratio in the state does not evince any trend.

  An increase of more than 70 percent in literacy rate of the state was observed during the last two decades from a level of 41 percent in 1991 to 70 percent in 2011. Male literacy rate (79%) in the state was about 34 percent higher compared to female literacy rate (59%) in 2011. Nevertheless, female literacy rate in the state has increased by nearly 143 percent during 1991-2011.

- Female literacy in ER and SR was relatively lower as compared to other regions. Overall literacy rate was observed to be highest in CR (71%), while male literacy rate was up to nearly 81% in SR, relatively high as compared to other regions of the state.

- Gross enrolment ratio, especially at Junior Basic School level has recorded a tremendous rise in the state from a level of 57 percent during 2002-03 to a level of 213 percent during 2008-09.

- Districts in ER namely Mirzapur, Sonbhadra, Allahabad, and Sant Ravidas Nagar had 20-25 percent households deprived of clean drinking water facility.

- Apart from some districts of ER, other districts, belonging to other regions along Ganga river, such as, Mainpuri, Fatehpur, Rae Bareli, Etah, Hathras also had less than 25 percent of total households having access to toilet facility during 2007-08.

- Infant mortality rate of 71 per 1000 live births (rural: 74; urban: 54) was recorded in Uttar Pradesh during 2010-11. U5MR was recorded 94 per 1000 live births, while neo-natal and post neo-natal mortality rate were observed around 50 and 21 per 1000 live births respectively. Mortality rates were higher in rural areas as compared to urban, and among females as compared to males. The life expectancy at birth of a person in Uttar Pradesh was measured as 60 years in 2011.

- The rise in the urban population in the NUGP and the CR is projected to grow faster while ER may record a fast increase in the rural population growth rate in 2025 and 2050. These developments may have serious implications for the demand for ground and surface water, supply of which is already under heavy stress.

- The projections regarding the demand for and supply of water for 2050, appear to be providing a hint that there would still be some surplus water even by 2050, provided all the assumptions of the projections hold true. However, as these projections do not account for sparing water maintaining a minimum water flow in the Ganges to meet the ecological needs and downstream commitments, the demand estimates appear to be on much lower side. Accounting for all these factors may result in a deficiency of supply contrary to what has been projected.

8.2 Policy Implications

The above analyses highlight that there have been marked differences among the various regions in Uttar Pradesh in regard of the various demographic indicators. However, as the focus of this report is on the implications of the rise in population, levels of urbanisation and consequently intensification of agriculture to meet the increasing demands for food and other agricultural commodities, the discussion on the policy implications hinges around management of demand for and supply of water so as to ensure that the water resources are managed efficiently to ensure their sustainability and economic development. Since the current trends indicate that there is perceptible heterogeneity in regard of different demographic indicators having a bearing on the demand for and supply of water across various regions, the focus of the policy as well as the policy instruments have to be markedly different across different

regions. For instance, rise in the urban population in NUGP and CR is projected to grow faster while ER region is expected to record a fast increase in the rural population growth rate in 2025 and 2050. Similarly, CAGR is highest for CR followed by NUGP. Therefore, the emphasis of the policy may have to be different for these regions. Yet before initiating any discussion on the policy implications, it may be pointed out that the water use is an extremely sensitive matter and its volume usage and usage practices are age old and have, more or less, become part of the life style of various stakeholders. Therefore, any deviation from the existing practices, in favour of better management of demand and supplies, causing discomfort to some of them, may have hard-to-accept political repercussions. Besides, these corrective measures may also entail large investment which may force policy makers to decide on the priorities and initiate interventions in stages. It implies that these changes are likely to be slow, even if political willingness to enforce the same is strong. However, given the current magnitude of problems, pro-active and timely interventions are required to be made immediately so that by the time full effect of these measures are felt, they become acceptable to all stakeholders. The measures may encompass the determination of the entitlements and rights for different stakeholders, formulation of suitable macroeconomic policies, building up of relevant institutions with needed capacities, governance directions and regulatory authorization, besides public involvement. Some of the possible interventions are discussed below:

- Since 93% of the water in Uttar Pradesh is used for irrigation purposes only, the deficit between demand for water and supply of the same could be far more effectively bridged by enhancing water use efficiency and productivity in agriculture through improved irrigation technology and practices. As groundwater pumping contributes to 70.2% irrigation in U.P., the saving in irrigation water will cause saving of energy also. According to an estimate, these systems irrigate at an efficiency of 30-45% ((Problems and Prospects of Saving Water and Energy in Agriculture in Upper Ganga River Basin, WWF). There are good possibilities of improving efficiency, effectiveness, economy and equity of water use in agriculture through technological intervention, better water management practices, shifting cropping pattern towards less water consuming crops and implementing appropriate water price policy, thus making more water available to other development sectors and environmental needs.

- There is a need to regulate exploitation of surface and ground water for diverse uses which would be possible only through a wide social mobilization as ground water management has now acquired a socio-economic-cultural-legal perspective. This social mobilisation calls for ‘enhancing communication between water specialists, decision-makers and communities to strengthen public participation in groundwater protection (Bhargava et al 2010). It is also required to be preceded by massive efforts to sensitize and educate various stakeholders.

- The capacity building of government institutions and other stakeholders for the sustainable development and management of groundwater is the most warranted action, as it would help to strengthen and utilize skills/capabilities of people and institutions towards achieving sustainable development of ground water resources through combining the efforts of all the

stakeholders. Given the tremendous stress on the ground water, there is a need for very swift movement, supported by enabling legal, institutional, technological and economic framework, towards the conjunctive use of groundwater and surface water. In order to arrest the further proliferation of private tube wells, community tube wells, supported by the provision of higher subsidy, needs to be promoted. This would not only save the energy but also help to regulate the over-exploitation of water.

- Our study shows that a majority of households in the basin do not have access to sanitary toilets and safe drinking piped water. Moreover, due to lack of awareness and cultural factors, most of people defecate in open, adversely affecting their health and creating non-point source of water pollution. Therefore priority must be given to create adequate public awareness about health and sanitation and appropriate incentives be provided to rural households for construction of toilets. Gram Panchayats and local NGOs may be involved in creating public awareness and also for effective implementation of total sanitation programme.

- Due to increasing population pressure in the urban areas, especially in the fast growing NUGP, CR and SUGP regions of the State, not only demand for water for various purposes have been rising but also safe disposal of urban household sewage and industrial wastes have become major problem. Therefore, there is a need to increase investment towards creating infrastructure for treating, re-cycling and re-using sewage /wastewater so that no treated or untreated wastewater goes to the river.

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Appendix

TableA1a: GSDP, in Uttar Pradesh, 1990-00 to 2007-08 (at 1999-2000 Prices)(Rs. in Crore)

State/region	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Uttar Pradesh	**173058**	**178670**	**183078**	**188919**	**198394**	**206941**	**219494**	**236001**	**254422**
Northern Upper Ganga Plains	4049 (1380)	4123 (1446)	4207 (1432)	4306 (1443)	4570 (1546)	4860 (1705)	5161 (1934)	5523 (2053)	5963 (2277)
Southern Upper Ganga Plains	2661 (1192)	2743 (1110)	2776 (1179)	2859 (1315)	2948 (1367)	3105 (1467)	3269 (1547)	3539 (1671)	3810 (1817)
Central Region	2998 (1459)	3262 (1856)	3334 (1822)	3691 (2466)	3707 (2213)	3994 (2556)	4169 (2745)	4444 (2896)	4858 (3167)
Southern Region	1228 (626)	1202 (676)	1308 (724)	1345 (750)	1447 (766)	1521 (815)	1526 (805)	1662 (884)	1672 (972)
Eastern Region	1917 (957)	1965 (1004)	2024 (986)	2023 (1047)	2189 (1105)	2184 (1126)	2381 (1246)	2555 (1381)	2763 (1433)
Districts of UP along Ganga	**2697 (1352)**	**2835 (1487)**	**2903 (1558)**	**2928 (1711)**	**3072 (1776)**	**3194 (1968)**	**3381 (2075)**	**3661 (2283)**	**3950 (2436)**
Other districts	2406 (1386)	2469 (1454)	2530 (1436)	2631 (1638)	2764 (1621)	2886 (1777)	3066 (1919)	3286 (2036)	3541 (2229)

Note: Figures for regions represent average value of GSDP per district while figures in parentheses represent Std. Deviation.

Table A1b: GSDP in Primary Sector (at 1999-2000 Prices),Uttar Pradesh, 1990-00 to 2007-08(Rs. in Crore)

State/Region	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Uttar Pradesh	**62320**	**62648**	**63380**	**63820**	**65698**	**66119**	**68623**	**70366**	**72278**
Northern Upper Ganga Plains	1346 (516)	1396 (520)	1393 (538)	1393 (549)	1436 (585)	1487 (599)	1539 (646)	1578 (652)	1620 (647)
Southern Upper Ganga Plains	1078 (491)	1080 (481)	1090 (501)	1082 (505)	1087 (492)	1132 (512)	1159 (526)	1218 (528)	1258 (536)
Central Region	892 (252)	968 (347)	943 (280)	1098 (489)	1001 (316)	1055 (343)	1028 (334)	1058 (350)	1120 (412)
Southern Region	496 (151)	429 (139)	500 (183)	520 (213)	562 (200)	585 (221)	526 (177)	551 (207)	465 (177)
Eastern Region	705 (267)	689 (247)	701 (257)	666 (284)	738 (286)	682 (263)	763 (342)	759 (311)	791 (280)
Districts of UP along Ganga	**859 (416)**	**855 (424)**	**880 (457)**	**841 (484)**	**885 (468)**	**864 (494)**	**883 (463)**	**910 (484)**	**931 (494)**
Other Districts	899 (452)	907 (473)	913 (461)	933 (501)	954 (470)	969 (496)	1009 (537)	1033 (540)	1063 (555)

Note: Note: Figures for regions represent average values of GSDP per district while figures in parentheses represent Std. Deviation.

Table A1c: GSDP in Secondary Sector (at 1999-2000 prices), Uttar Pradesh, 1990-00 to 2007-08(Rs. in crores)

Regions	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Uttar Pradesh	**38426**	**38761**	**39203**	**40937**	**43652**	**46629**	**50388**	**58958**	**67943**
Northern Upper Ganga Plains	1176 (816)	1084 (771)	1103 (768)	1151 (721)	1259 (767)	1382 (985)	1491 (1072)	1693 (1079)	1915 (1178)
Southern Upper Ganga Plains	548 (337)	554 (303)	543 (312)	592 (377)	622 (411)	654 (428)	705 (466)	825 (552)	954 (621)
Central Region	648 (532)	694 (625)	720 (667)	737 (682)	770 (687)	845 (757)	916 (821)	1053 (910)	1208 (1013)
Southern Region	207 (192)	214 (189)	220 (199)	215 (181)	231 (204)	244 (214)	270 (228)	333 (266)	401 (310)
Eastern Region	373 (334)	398 (373)	404 (359)	416 (382)	442 (406)	458 (418)	495 (442)	600 (531)	699 (596)
Districts of UP along Ganga	645 (458)	691 (524)	683 (549)	702 (573)	722 (601)	769 (638)	830 (686)	973 (799)	1119 (895)
Other Districts	520 (541)	513 (509)	523 (511)	550 (525)	594 (565)	636 (652)	687 (705)	804 (763)	927 (846)

Note: Figures represent the average value of district(s) in the particular region. $ Figures in parentheses represent Std. Deviation.

Table A1d: GSDP (in Tertiary Sector (at 1999-2000 Prices), Uttar Pradesh, 1990-00 to 2007-08Rs. in Crore)

Region	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Uttar Pradesh	**72312**	**77261**	**80494**	**84163**	**89044**	**94192**	**100483**	**106677**	**114200**
Northern Upper Ganga Plains	1527 (559)	1642 (620)	1711 (624)	1763 (645)	1874 (689)	1990 (763)	2131 (848)	2252 (896)	2428 (992)
Southern Upper Ganga Plains	1035 (495)	1108 (481)	1142 (516)	1185 (564)	1239 (600)	1320 (663)	1405 (709)	1497 (753)	1597 (813)
Central Region	1457 (1067)	1599 (1212)	1671 (1253)	1856 (1581)	1936 (1614)	2094 (1883)	2225 (2021)	2333 (2083)	2529 (2272)
Southern Region	526 (317)	560 (367)	588 (374)	610 (390)	654 (408)	692 (436)	730 (452)	778 (490)	806 (534)
Eastern Region	839 (480)	877 (512)	919 (513)	941 (536)	1008 (569)	1043 (599)	1123 (643)	1195 (716)	1272 (737)
Districts of UP along Ganga	**1193 (744)**	**1288 (813)**	**1340 (844)**	**1386 (938)**	**1465 (996)**	**1561 (1168)**	**1667 (1242)**	**1778 (1319)**	**1900 (1401)**
Other Districts	986 (622)	1049 (680)	1094 (698)	1148 (808)	1215 (834)	1282 (915)	1370 (986)	1449 (1031)	1552 (1128)

Note: Figures represent the average value of district(s) in the particular region. $ Figures in parentheses represent Std. Deviation.

Table A1e: Per Capita Income (Rs.) in Uttar Pradesh, 1990-00 to 200708 (at 1999-2000 Prices)

State/Region	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Uttar Pradesh	**10759**	**10854**	**10868**	**11014**	**11340**	**11599**	**12069**	**12734**	**13475**
Northern Upper Ganga Plains	17847 (7910)	17771 (7802)	17648 (7539)	17661 (6913)	18383 (7439)	19401 (9424)	20065 (10148)	20910 (9714)	21965 (9805)
Southern Upper Ganga Plains	11742 (1763)	12116 (2083)	11852 (1870)	11900 (2264)	12003 (2263)	12426 (2452)	12771 (2367)	13631 (2592)	14447 (2987)
Central Region	10101 (2831)	10584 (3745)	10609 (3435)	11363 (5143)	11252 (4150)	11758 (4735)	12000 (4982)	12551 (5074)	13460 (5390)
Southern Region	10439 (2570)	9933 (2731)	10567 (2827)	10697 (3000)	11355 (2870)	11768 (3238)	11587 (2848)	12427 (3302)	12140 (3438)
Eastern Region	8277 (4061)	8153 (3243)	8254 (3314)	8111 (3845)	8605 (3668)	8396 (3656)	8997 (4186)	9370 (3970)	9924 (3590)
Districts of UP along Ganga	**10527 (2909)**	**10819 (3283)**	**10802 (3278)**	**10607 (3749)**	**10875 (3654)**	**11099 (4099)**	**11453 (3922)**	**12120 (4115)**	**12865 (4244)**
Other districts	11058 (5668)	11027 (5483)	11064 (5309)	11210 (5547)	11610 (5520)	11899 (6328)	12343 (6705)	12960 (6678)	13583 (6812)

Note: Figures represent the average value of district(s) in the particular region. $ Figures in parentheses represent Std. Deviation.

Table A2a: Percentage share of NUGP in Total GSDP of the State by Economic Activity

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture &Allied	22.22	22.96	22.67	22.68	22.66	23.36	23.41	23.35	23.08
Forestry & Logging	17.19	16.22	16.27	16.32	16.80	16.62	17.85	17.78	18.54
Fishing	7.91	7.70	7.70	7.70	7.70	7.75	7.86	7.86	7.86
Mining & Quarrying	11.18	12.60	9.67	8.83	9.05	10.36	9.54	10.80	12.74
PRIMARY	**21.60**	**22.29**	**21.98**	**21.82**	**21.86**	**22.49**	**22.43**	**22.42**	**22.41**
Manufacturing	38.49	35.64	36.04	35.28	36.58	37.57	38.20	37.97	37.67
Construction	21.70	19.09	19.38	19.77	20.26	21.11	19.63	19.63	21.16
Electricity, Gas &Water	15.25	15.28	15.32	15.38	15.50	15.39	15.33	15.45	15.64
SECONDARY	**30.59**	**27.97**	**28.15**	**28.11**	**28.85**	**29.65**	**29.59**	**28.72**	**28.19**
Transport, Storage & Communication	21.29	20.57	20.43	20.39	20.37	20.31	20.35	20.23	19.89
Railway	14.48	14.48	14.48	14.48	14.48	14.48	14.48	14.48	14.48
Other means of Transport & Storage	24.43	23.99	24.07	24.15	24.05	23.98	24.05	24.28	23.95
Communication	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05
Trade and Hotel & Restaurant	25.16	25.48	25.65	25.50	25.95	26.68	27.19	27.02	27.14
Transport, Com. & Trade	23.93	23.69	23.73	23.51	23.69	23.99	24.18	23.99	23.63
Banking and Insurance	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10	19.10
Real Estate, housing and Business Services	19.26	19.72	20.03	20.29	20.63	21.00	21.42	21.37	21.99
Finance and Real Estate	19.21	19.51	19.71	19.85	20.08	20.30	20.52	20.48	20.66
Public Administration	15.19	14.25	13.59	12.29	12.35	12.29	12.05	12.52	12.56
Other Services	20.54	21.82	21.74	21.74	21.72	21.19	20.58	20.61	21.36
Community and Personal Services	18.45	18.88	18.63	17.96	17.78	17.42	17.14	17.17	17.83
Tertiary	**21.12**	**21.26**	**21.25**	**20.95**	**21.05**	**21.13**	**21.18**	**21.11**	**21.26**
GDDP	**23.40**	**23.07**	**22.98**	**22.80**	**23.04**	**23.48**	**23.50**	**23.40**	**23.44**

Table A2b: Percentage share of SUGP in Total GSDP of the State by Economic Activity

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	30.47	30.39	30.29	30.08	29.27	30.36	30.19	30.91	30.83
Foresty & Logging	22.74	22.95	22.90	22.81	22.87	22.69	22.63	22.79	22.85
Fishing	4.94	4.81	4.81	4.81	4.81	4.85	4.86	4.85	4.85
Mining & Quarrying	10.33	10.42	8.80	8.82	8.82	10.05	9.29	10.74	10.23
PRIMARY	**29.40**	**29.31**	**29.25**	**28.81**	**28.13**	**29.10**	**28.71**	**29.43**	**29.60**
Manufacturing	24.69	25.49	24.31	25.87	24.85	24.70	24.54	24.67	24.79
Construction	24.37	22.62	22.39	22.67	23.57	22.55	22.69	22.64	23.00
Elect., Gas & Water	22.66	22.73	22.80	22.92	22.98	22.81	22.88	23.00	23.18
SECONDARY	**24.26**	**24.30**	**23.56**	**24.59**	**24.21**	**23.84**	**23.78**	**23.78**	**23.88**
Transport, Storage & Com.	22.68	22.56	22.55	22.48	22.47	22.44	22.46	22.29	22.37
Railway	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
Other means of Trans. & Storage	23.83	23.82	23.92	23.81	23.76	23.69	23.72	23.52	23.76
Communication	22.08	22.08	22.08	22.08	22.08	22.08	22.08	22.08	22.08
Trade and Hotel & Restaurant	27.44	28.80	27.96	28.01	27.22	27.70	27.47	27.99	28.11
Transport, Com.& Trade	25.93	26.53	25.97	25.85	25.30	25.48	25.27	25.45	25.33
Banking and Insurance	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Real Estate, Housing and Business Services	23.83	23.76	23.80	23.82	23.76	23.67	23.57	23.62	23.25
Finance and Real Estate	23.06	22.93	22.93	22.88	22.86	22.78	22.67	22.70	22.32
Public Administration	21.91	21.74	21.65	20.91	21.01	20.87	20.96	21.15	21.68
Other Services	23.66	22.53	22.55	22.54	22.35	23.01	23.06	23.12	23.05
Community and Personal Services	22.98	22.22	22.20	21.89	21.79	22.11	22.21	22.28	22.50
Tertiary	**24.34**	**24.39**	**24.13**	**23.93**	**23.66**	**23.82**	**23.73**	**23.85**	**23.78**
GSDP	**26.14**	**26.10**	**25.78**	**25.72**	**25.26**	**25.51**	**25.30**	**25.49**	**25.46**

Table A2c: Percentage share of Central Region in Total GSDP of the State by Economic Activity

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	**13.13**	**14.12**	**13.55**	**15.90**	**13.96**	**14.64**	**13.94**	**13.95**	**14.27**
Forestry& Logging	11.13	14.30	14.28	14.33	14.31	14.41	11.15	11.36	11.16
Fishing	12.68	14.97	14.97	14.97	14.97	16.25	13.70	13.64	13.64
Mining & Quarrying	6.96	6.13	5.64	5.17	4.96	5.72	5.38	6.17	6.74
PRIMARY	**12.89**	**13.91**	**13.40**	**15.48**	**13.71**	**14.36**	**13.48**	**13.53**	**13.95**
Manufacturing	14.09	14.91	15.47	14.40	14.38	15.01	15.02	14.39	14.39
Construction	16.49	18.09	18.33	19.64	18.39	18.55	18.59	18.28	17.47
Electricity, Gas & Water Supply	17.13	17.37	17.40	17.57	17.23	17.43	17.44	17.40	17.47
SECONDARY	**15.17**	**16.12**	**16.53**	**16.20**	**15.87**	**16.31**	**16.36**	**16.08**	**16.00**
Transport, Storage & Communication	18.45	18.88	18.95	19.04	19.10	19.19	19.24	19.35	19.55
Railway	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88	17.88
Other means of Transport & Storage	17.98	18.00	18.02	17.99	17.96	18.03	18.01	18.13	18.09
Communication	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26
Trade and Hotel & Restaurant	13.15	14.09	13.94	15.18	13.89	14.47	13.81	13.92	14.09
Transport, Communication & Trade	14.83	15.84	15.78	16.69	16.00	16.47	16.19	16.34	16.73
Banking and Insurance	28.25	28.25	28.25	28.25	28.25	28.25	28.25	28.25	28.25
Real Estate, Ownership of Dwellings and Business Services	17.93	18.07	18.18	18.26	18.37	18.49	18.62	18.64	18.75
Finance and Real Estate	21.01	21.44	21.60	21.91	21.89	22.10	22.33	22.40	23.14
Public Administration	25.55	25.51	25.71	30.75	30.73	32.27	32.19	29.25	28.72
Other Services	17.80	17.65	17.81	17.74	17.75	17.54	17.86	17.92	18.16
Community and Personal Services	20.82	20.71	20.82	22.95	23.20	23.77	23.64	22.74	22.40
Tertiary	**18.14**	**18.63**	**18.68**	**19.85**	**19.57**	**20.01**	**19.90**	**19.68**	**19.93**
GSDP	**15.59**	**16.43**	**16.39**	**17.58**	**16.81**	**17.37**	**17.08**	**16.95**	**17.18**

Table A2d: Percentage Share of Southern Region in Total GSDP of the State by Economic Activity

ECONOMIC ACTIVITY	Southern Region								
	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	5.23	4.39	5.24	5.35	5.66	5.84	4.93	4.97	3.97
Forestry & Logging	4.92	4.62	4.50	4.57	4.38	4.44	4.63	4.50	4.41
Fishing	30.60	29.80	29.80	29.80	29.80	29.97	28.96	28.95	28.95
Mining & Quarrying	8.85	8.72	6.21	7.75	7.66	8.44	7.90	9.47	9.29
PRIMARY	**5.57**	**4.79**	**5.52**	**5.71**	**5.99**	**6.19**	**5.37**	**5.48**	**4.50**
Manufacturing	2.65	2.82	2.91	2.47	2.44	2.39	2.32	2.32	2.35
Construction	6.29	6.64	6.61	6.76	6.80	6.71	6.98	6.95	6.72
Electricity, Gas & Water	4.29	3.57	3.53	3.49	3.53	3.53	3.49	3.47	3.44
SECONDARY	**3.76**	**3.87**	**3.93**	**3.67**	**3.71**	**3.67**	**3.75**	**3.96**	**4.13**
Transport, Storage & Com.	6.36	6.26	6.25	6.23	6.20	6.17	6.14	6.19	6.12
Railway	10.85	10.85	10.85	10.85	10.85	10.85	10.85	10.85	10.85
Other means of Transport & Storage	4.96	4.96	4.84	4.88	4.98	5.01	5.04	4.97	5.01
Communication	4.79	4.79	4.79	4.79	4.79	4.79	4.79	4.79	4.79
Trade and Hotel & Restaurant	4.82	4.71	4.84	4.82	5.00	5.04	4.48	4.49	3.84
Transport, Com.& Trade	5.31	5.27	5.36	5.37	5.49	5.52	5.21	5.25	4.94
Banking and Insurance	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.96
Real Estate, Housing and Business Services	5.32	5.29	5.28	5.27	5.24	5.20	5.14	5.13	5.05
Finance and Real Estate	4.91	4.85	4.83	4.79	4.78	4.74	4.69	4.67	4.55
Public Administration	4.26	4.50	4.63	4.45	4.51	4.46	4.94	5.14	5.11
Other Services	5.30	5.21	5.17	5.11	5.16	5.19	5.33	5.27	5.44
Community and Personal Services	4.90	4.93	4.96	4.84	4.89	4.88	5.17	5.21	5.30
Tertiary	**5.09**	**5.07**	**5.11**	**5.07**	**5.14**	**5.14**	**5.08**	**5.10**	**4.94**
GSDP	**4.97**	**4.71**	**5.00**	**4.98**	**5.10**	**5.15**	**4.86**	**4.93**	**4.60**

Table A2e: Percentage Share of Eastern Region in Total GSDP of the State by Economic Activity

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	28.94	28.14	28.25	25.98	28.45	25.80	27.52	26.82	27.85
Forestry & Logging	44.02	41.92	42.05	41.98	41.64	41.84	43.73	43.57	43.05
Fishing	43.86	42.72	42.72	42.72	42.72	41.19	44.63	44.69	44.69
Mining & Quarrying	62.68	62.13	69.68	69.43	69.51	65.43	67.89	62.82	61.00
PRIMARY	**30.54**	**29.70**	**29.86**	**28.18**	**30.32**	**27.86**	**30.03**	**29.14**	**29.54**
Manufacturing	20.08	21.12	21.27	21.98	21.75	20.33	19.91	20.65	20.80
Registered	11.99	12.62	13.20	14.73	14.22	11.99	11.99	12.75	12.75
Unregistered	30.85	30.85	30.85	30.85	30.85	30.85	30.85	30.85	30.85
Construction	31.15	33.56	33.29	31.17	30.98	31.08	32.12	32.51	31.65
Electricity, Gas & Water Supply	40.67	41.05	40.95	40.64	40.75	40.84	40.85	40.68	40.27
SECONDARY	**26.22**	**27.74**	**27.83**	**27.43**	**27.37**	**26.54**	**26.52**	**27.47**	**27.79**
Transport, Storage & Communication	31.22	31.72	31.82	31.86	31.86	31.88	31.81	31.94	32.07
Railway	36.89	36.89	36.89	36.89	36.89	36.89	36.89	36.89	36.89
Other means of Transport & Storage	28.80	29.22	29.15	29.17	29.25	29.30	29.19	29.10	29.19
Communication	32.83	32.83	32.83	32.83	32.83	32.83	32.83	32.83	32.83
Trade and Hotel & Restaurant	29.44	26.91	27.62	26.48	27.94	26.11	27.05	26.58	26.83
Transport, Com.& Trade	30.00	28.67	29.16	28.58	29.53	28.55	29.15	28.97	29.37
Banking andInsurance	27.44	27.44	27.44	27.44	27.44	27.44	27.44	27.44	27.44
Real Estate, Housing and Business Services	33.67	33.17	32.71	32.36	32.00	31.64	31.26	31.24	30.95
Finance and Real Estate	31.81	31.27	30.92	30.57	30.38	30.08	29.79	29.76	29.33
Public Administration	33.10	34.00	34.43	31.61	31.39	30.11	29.85	31.94	31.93
Other Services	32.69	32.79	32.73	32.86	33.03	33.07	33.17	33.08	32.00
Community and Personal Services	32.85	33.26	33.38	32.36	32.34	31.82	31.83	32.60	31.97
Tertiary	**31.31**	**30.65**	**30.83**	**30.20**	**30.58**	**29.90**	**30.12**	**30.25**	**30.08**
GSDP	**29.90**	**29.69**	**29.85**	**28.92**	**29.79**	**28.49**	**29.26**	**29.23**	**29.32**

Table A3a: Percentage Share of Different Economic Activities in the Total GSDP of Uttar Pradesh

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	33.50	32.58	32.27	31.11	30.59	29.39	28.43	27.18	26.26
Forestry & Logging	1.10	1.11	1.12	1.12	1.09	1.08	1.06	0.95	0.91
Fishing	0.35	0.37	0.39	0.42	0.43	0.42	0.42	0.41	0.42
Mining & Quarrying	1.06	1.00	0.83	1.14	1.00	1.06	1.33	1.28	0.83
PRIMARY	**36.01**	**35.06**	**34.62**	**33.78**	**33.12**	**31.95**	**31.24**	**29.82**	**28.41**
Manufacturing	13.26	12.56	12.22	12.72	12.72	13.03	13.15	13.26	12.75
Construction	5.02	5.15	5.28	5.16	5.40	5.63	6.10	7.88	9.84
Electricity, Gas & Water Supply	3.91	3.99	3.91	3.79	3.88	3.87	3.69	3.85	4.11
SECONDARY	**22.20**	**21.69**	**21.41**	**21.67**	**22.00**	**22.53**	**22.94**	**24.98**	**26.70**
Transport, Storage & Com.	6.02	7.30	7.48	7.88	8.37	8.87	9.30	9.36	10.18
Railway	1.45	1.65	1.77	1.81	1.81	1.86	1.88	2.03	2.08
Other means of Transport & Storage	3.87	4.10	4.01	4.09	4.31	4.51	4.68	4.45	4.44
Communication	0.69	1.55	1.70	1.98	2.25	2.50	2.74	2.88	3.66
Trade and Hotel & Rest.	12.98	12.73	12.87	12.34	12.31	12.12	11.85	11.64	10.83
Transport, Com.& Trade	19.00	20.02	20.35	20.22	20.68	20.98	21.15	21.00	21.00
Banking and Insurance	2.94	3.46	3.62	4.03	3.80	3.98	4.09	4.10	5.27
Real Estate, Housing and Business Services	6.91	6.97	7.03	7.01	6.86	6.76	6.54	6.39	6.15
Finance and Real Estate	9.85	10.43	10.65	11.04	10.66	10.74	10.63	10.49	11.42
Public Administration	5.05	4.97	4.94	5.32	5.69	5.84	5.66	5.83	5.00
Other Services	7.89	7.81	8.02	7.97	7.85	7.95	8.37	7.88	7.46
Community and Personal Services	12.94	12.79	12.96	13.29	13.54	13.79	14.03	13.70	12.47
TERTIARY	**41.79**	**43.24**	**43.97**	**44.55**	**44.88**	**45.52**	**45.82**	**45.20**	**44.89**
GSDP	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table A3b: Percentage shares of different Activities in total GSDP in NUGP of Uttar Pradesh

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	31.82	32.41	31.83	30.95	30.09	29.23	28.33	27.12	25.86
Forestry & Logging	0.81	0.78	0.79	0.80	0.80	0.77	0.80	0.72	0.72
Fishing	0.12	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14
Mining & Quarrying	0.51	0.55	0.35	0.44	0.40	0.47	0.54	0.59	0.45
PRIMARY	**33.25**	**33.87**	**33.11**	**32.34**	**31.43**	**30.60**	**29.82**	**28.57**	**27.16**
Manufacturing	21.82	19.39	19.16	19.69	20.20	20.85	21.38	21.51	20.49
Construction	4.66	4.26	4.46	4.47	4.75	5.06	5.09	6.61	8.88
Electricity, Gas & Water	2.55	2.64	2.61	2.56	2.61	2.53	2.41	2.54	2.74
SECONDARY	**29.03**	**26.29**	**26.23**	**26.72**	**27.56**	**28.45**	**28.89**	**30.66**	**32.12**
Transport, Storage & Com.n	5.48	6.51	6.65	7.05	7.40	7.67	8.06	8.09	8.64
Railway	0.90	1.03	1.12	1.15	1.14	1.14	1.16	1.26	1.28
Other means of Transport & Storage	4.04	4.26	4.20	4.33	4.50	4.60	4.79	4.61	4.54
Communication	0.54	1.22	1.33	1.57	1.76	1.92	2.11	2.22	2.82
Trade and Hotel & Restaurant	13.95	14.05	14.37	13.81	13.86	13.77	13.71	13.44	12.54
Transport, Communication & Trade	19.43	20.56	21.01	20.85	21.26	21.44	21.77	21.53	21.17
Banking and Insurance	2.40	2.86	3.01	3.38	3.15	3.24	3.33	3.35	4.29
Real Estate, Ownership of Dwellings and Business Services	5.69	5.96	6.13	6.24	6.15	6.05	5.96	5.84	5.77
Finance and Real Estate	8.09	8.82	9.14	9.62	9.30	9.29	9.29	9.18	10.06
Public Administration	3.28	3.07	2.92	2.87	3.05	3.06	2.91	3.12	2.68
Other Services	6.93	7.39	7.59	7.60	7.40	7.17	7.33	6.94	6.80
Community and Personal Services	10.20	10.46	10.51	10.47	10.45	10.23	10.24	10.06	9.48
TERTIARY	**37.72**	**39.84**	**40.66**	**40.94**	**41.01**	**40.95**	**41.30**	**40.77**	**40.72**
GSDP	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table A3c: Percentage share of different Activities in total GSDP in SUGP of Uttar Pradesh

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Allied	39.05	37.94	37.92	36.38	35.45	34.98	33.94	32.95	31.80
Forestry & Logging	0.96	0.98	1.00	0.99	0.99	0.96	0.94	0.85	0.81
Fishing	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08
Mining & Quarrying	0.42	0.40	0.29	0.39	0.35	0.42	0.49	0.54	0.33
PRIMARY	**40.50**	**39.39**	**39.28**	**37.84**	**36.87**	**36.44**	**35.45**	**34.41**	**33.03**
Manufacturing	12.53	12.27	11.52	12.80	12.51	12.62	12.76	12.83	12.42
Construction	4.68	4.46	4.59	4.55	5.04	4.98	5.47	6.99	8.89
Electricity, Gas & Water	3.39	3.48	3.46	3.37	3.53	3.46	3.34	3.47	3.74
SECONDARY	**20.60**	**20.20**	**19.57**	**20.72**	**21.09**	**21.06**	**21.57**	**23.30**	**25.05**
Transport, Storage & Com.	5.22	6.31	6.54	6.88	7.45	7.80	8.26	8.18	8.94
Railway	1.11	1.26	1.37	1.40	1.42	1.45	1.48	1.59	1.62
Other means of Transport & Storage	3.53	3.74	3.72	3.78	4.06	4.19	4.39	4.10	4.14
Communication	0.59	1.31	1.45	1.70	1.96	2.17	2.39	2.49	3.18
Trade and Hotel & Restaurant	13.62	14.05	13.96	13.43	13.26	13.16	12.86	12.78	11.95
Transport, Communication & Trade	18.84	20.36	20.50	20.32	20.71	20.96	21.13	20.97	20.89
Banking and Insurance	2.39	2.82	2.99	3.33	3.20	3.31	3.44	3.42	4.40
Real Estate, Ownership of Dwellings and Business Services	6.30	6.35	6.49	6.49	6.45	6.28	6.09	5.92	5.62
Finance and Real Estate	8.69	9.17	9.48	9.82	9.65	9.59	9.53	9.34	10.01
Public Administration	4.23	4.14	4.15	4.33	4.73	4.78	4.69	4.83	4.26
Other Services	7.14	6.74	7.02	6.98	6.95	7.17	7.63	7.14	6.76
Community and Personal Services	11.37	10.89	11.17	11.31	11.68	11.95	12.32	11.98	11.02
TERTIARY	**38.90**	**40.41**	**41.15**	**41.45**	**42.04**	**42.50**	**42.98**	**42.29**	**41.92**
GSDP	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table A3d: Percentage share of different Activities in total GSDP in Central Region of Uttar Pradesh

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Animal Husbandry	28.23	28.01	26.68	28.14	25.39	24.77	23.20	22.37	21.81
Forestry & Logging	0.78	0.97	0.98	0.91	0.93	0.90	0.69	0.63	0.59
Fishing	0.28	0.34	0.36	0.36	0.38	0.40	0.33	0.33	0.33
Mining & Quarrying	0.47	0.37	0.29	0.33	0.30	0.35	0.42	0.47	0.32
PRIMARY	**29.77**	**29.68**	**28.30**	**29.74**	**27.00**	**26.41**	**24.65**	**23.80**	**23.06**
Manufacturing	11.99	11.40	11.53	10.42	10.87	11.26	11.57	11.25	10.68
Construction	5.32	5.67	5.91	5.76	5.91	6.01	6.63	8.49	10.01
Electricity, Gas & Water Supply	4.30	4.22	4.15	3.78	3.98	3.88	3.77	3.95	4.18
SECONDARY	**21.61**	**21.28**	**21.59**	**19.97**	**20.76**	**21.16**	**21.97**	**23.70**	**24.87**
Transport, Storage & Communication	7.12	8.39	8.64	8.53	9.50	9.80	10.48	10.68	11.58
Railway	1.67	1.79	1.93	1.84	1.92	1.91	1.96	2.14	2.16
Other means of Transport & Storage	4.46	4.49	4.41	4.18	4.61	4.68	4.94	4.76	4.67
Communication	0.99	2.11	2.31	2.51	2.98	3.21	3.58	3.78	4.75
Trade and Hotel & Restaurant	10.94	10.91	10.95	10.66	10.17	10.09	9.58	9.56	8.87
Transport, Communication & Trade	18.07	19.30	19.59	19.19	19.67	19.89	20.06	20.24	20.45
Banking and Insurance	5.32	5.95	6.25	6.48	6.39	6.47	6.77	6.84	8.66
Real Estate, Ownership of Dwellings and Business Services	7.95	7.67	7.80	7.28	7.50	7.20	7.13	7.03	6.71
Finance and Real Estate	13.28	13.62	14.04	13.76	13.89	13.67	13.90	13.87	15.37
Public Administration	8.27	7.72	7.75	9.31	10.40	10.84	10.68	10.06	8.36
Other Services	9.01	8.39	8.72	8.04	8.29	8.03	8.75	8.33	7.89
Community and Personal Services	17.28	16.12	16.47	17.35	18.68	18.87	19.43	18.39	16.25
TERTIARY	**48.62**	**49.03**	**50.11**	**50.30**	**52.24**	**52.43**	**53.38**	**52.50**	**52.07**
GSDP	**100.00**	**100.00**	**100.0**	**100.00**	**100.0**	**100.0**	**100.00**	**100.0**	**100.0**

Table A3e: Percentage share of different Activities in total GSDP in Southern Region of Uttar Pradesh

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Animal Husbandry	35.27	30.38	33.84	33.40	33.92	33.33	28.82	27.41	22.66
Forestry & Logging	1.09	1.09	1.01	1.03	0.94	0.93	1.00	0.86	0.87
Fishing	2.14	2.33	2.32	2.50	2.48	2.47	2.48	2.41	2.61
Mining & Quarrying	1.89	1.86	1.04	1.77	1.51	1.73	2.17	2.46	1.67
PRIMARY	**40.39**	**35.66**	**38.20**	**38.70**	**38.85**	**38.46**	**34.48**	**33.14**	**27.81**
Manufacturing	7.08	7.53	7.10	6.32	6.09	6.06	6.28	6.24	6.52
Construction	6.36	7.25	6.98	7.00	7.19	7.35	8.75	11.10	14.38
Electricity, Gas & Water Supply	3.38	3.03	2.76	2.65	2.69	2.65	2.65	2.71	3.07
SECONDARY	**16.82**	**17.81**	**16.85**	**15.96**	**15.97**	**16.06**	**17.67**	**20.05**	**23.97**
Transport, Storage & Communication	7.71	9.69	9.35	9.85	10.16	10.64	11.75	11.75	13.54
Railway	3.18	3.80	3.84	3.94	3.84	3.92	4.19	4.48	4.89
Other means of Transport & Storage	3.86	4.32	3.88	4.00	4.21	4.39	4.86	4.48	4.84
Communication	0.67	1.58	1.63	1.90	2.11	2.33	2.70	2.79	3.81
Trade and Hotel & Restaurant	12.59	12.72	12.45	11.94	12.07	11.87	10.92	10.61	9.03
Transport, Communication & Trade	20.30	22.42	21.80	21.79	22.23	22.51	22.67	22.36	22.57
Banking and Insurance	2.34	2.91	2.87	3.20	2.95	3.06	3.33	3.29	4.53
Real Estate, Ownership of Dwellings and Business Services	7.40	7.82	7.42	7.42	7.04	6.83	6.92	6.65	6.76
Finance and Real Estate	9.74	10.73	10.29	10.62	9.99	9.89	10.25	9.95	11.29
Public Administration	4.33	4.75	4.57	4.75	5.03	5.06	5.76	6.07	5.55
Other Services	8.42	8.64	8.29	8.17	7.94	8.02	9.17	8.42	8.82
Community and Personal Services	12.75	13.39	12.86	12.92	12.97	13.07	14.93	14.50	14.37
TERTIARY	**42.79**	**46.54**	**44.95**	**45.33**	**45.18**	**45.47**	**47.85**	**46.80**	**48.23**
GSDP	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Table A3f: Percentage share of different Activities in total GSDP in ER of Uttar Pradesh

Economic Activity	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Agriculture & Animal Husbandry	32.43	30.88	30.54	27.95	29.22	26.61	26.74	24.94	24.94
Forestry & Logging	1.62	1.57	1.58	1.63	1.53	1.59	1.58	1.41	1.33
Fishing	0.51	0.53	0.56	0.62	0.61	0.61	0.64	0.63	0.63
Mining & Quarrying	2.22	2.10	1.95	2.73	2.35	2.42	3.10	2.75	1.72
PRIMARY	**36.78**	**35.08**	**34.63**	**32.92**	**33.71**	**31.24**	**32.05**	**29.73**	**28.63**
Manufacturing	8.91	8.93	8.70	9.67	9.29	9.30	8.95	9.36	9.05
Construction	5.23	5.82	5.89	5.56	5.62	6.15	6.69	8.76	10.62
Electricity, Gas & Water Supply	5.33	5.52	5.37	5.32	5.31	5.54	5.15	5.36	5.65
SECONDARY	**19.47**	**20.27**	**19.96**	**20.55**	**20.22**	**20.99**	**20.79**	**23.48**	**25.32**
Transport, Storage & Communication	6.28	7.80	7.97	8.68	8.95	9.92	10.11	10.23	11.13
Railway	1.79	2.05	2.19	2.31	2.24	2.40	2.37	2.57	2.61
Other means of Transport & Storage	3.73	4.03	3.91	4.12	4.24	4.64	4.67	4.43	4.42
Communication	0.76	1.72	1.87	2.25	2.48	2.88	3.08	3.23	4.10
Trade and Hotel & Restaurant	12.78	11.54	11.91	11.30	11.55	11.10	10.95	10.59	9.91
Transport, Communication & Trade	19.06	19.33	19.88	19.98	20.50	21.03	21.07	20.82	21.04
Banking and Insurance	2.70	3.20	3.33	3.83	3.50	3.83	3.84	3.85	4.93
Real Estate, Ownership of Dwellings and Business Services	7.78	7.79	7.70	7.85	7.37	7.51	6.99	6.83	6.49
Finance and Real Estate	10.48	10.99	11.04	11.68	10.88	11.34	10.82	10.68	11.42
Public Administration	5.59	5.70	5.70	5.82	6.00	6.17	5.78	6.37	5.45
Other Services	8.63	8.63	8.80	9.05	8.71	9.23	9.49	8.92	8.15
Community and Personal Services	14.21	14.33	14.50	14.87	14.70	15.40	15.26	15.29	13.60
TERTIARY	**43.75**	**44.65**	**45.41**	**46.53**	**46.08**	**47.77**	**47.15**	**46.79**	**46.06**
GROSS DISTRICT DOMESTIC PRODUCT	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table A4: Activity-wise CAGR in GSDP in Uttar Pradesh, 1990-2008

Economic Activity	U.P.	NUGP	SUGP	CR	SR	ER
Agriculture & Allied	1.69	2.19	1.86	2.15	0.40^{ns}	1.08^{ns}
Forestry & Logging	2.41	3.75	2.36	0.43^{ns}	1.58**	2.58
Fishing	6.92	7.06	6.89	6.78	6.28	7.39
Mining & Quarrying	5.88**	6.23**	6.39**	5.70*	7.67**	5.55**
PRIMARY	1.91	2.31	1.93	2.20**	1.20^{ns}	1.59**
Manufacturing	5.14	5.64	4.95	5.07	2.46**	4.90
Construction	12.70	12.83	12.31	13.13	13.65	12.49
Electricity, Gas & Water Supply	4.82	5.06	5.05	4.96	3.10**	4.70
SECONDARY	7.20	7.03	6.95	7.54	7.81	7.33
Transport, Storage & Communication	10.95	10.34	10.76	11.59	10.52	11.19
Railway	8.74	8.74	8.74	8.74	8.74	8.74
Other means of Transport & Storage	6.96	6.87	6.83	7.04	7.24	7.05
Communication	23.21	23.21	23.21	23.21	23.21	23.21
Trade and Hotel & Restaurant	2.80	3.90	2.74	3.09	0.83^{ns}	2.01**
Transport, Communication & Trade	5.99	6.07	5.48	7.08	5.42	5.89
Banking and Insurance	10.35	10.35	10.35	10.35	10.35	10.35
Real Estate, Ownership of Dwellings and Business Services	3.26	4.89	3.01	3.83	2.64	2.18
Finance and Real Estate	5.84	6.80	5.51	6.89	4.99	4.85
Public Administration	6.25	3.82**	5.91	8.71	8.49	5.08
Other Services	4.63	4.37	4.70	4.84	5.00	4.59
Community and Personal Services	5.28	4.20	5.17	6.80	6.30	4.79
TERTIARY	5.75	5.76	5.40	6.95	5.59	5.30
GSDP	4.83	5.05	4.45	5.80	4.49	4.52
Per Capita Income (in Rs.)	2.57	2.82	2.32**	3.29	2.63	2.28**

** p<0.05, *p<0.10, ns=not significant.

Note: All other values are significant at 1% significance level

Table A5a: Statistics Related to Commercial Banking inNorthern Upper Ganga Plains

Districts	Northern Upper Ganga Plain							
	Credit Deposit Ratio		No. of scheduled commercial banks per lakh of population		Per Capita Credits		Per Capita Deposits	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Saharanpur	37.18	72.88	5.0	5.5	1853	7432	4985	10198
Muzaffarnagar	40.17	90.08	5.2	5.2	1879	8752	4676	9716
Bijnor	45.17	81.68	4.3	4.3	1677	6480	3712	7934
Moradabad	39.97	65.90	5.0	5.1	2114	6816	5289	10343
Rampur	56.55	66.02	5.0	5.0	1323	3648	2340	5525
JyotibaPhuleNagar	38.49	65.50	4.2	5.3	1021	4685	2653	7153
Meerut	37.16	55.03	6.5	7.2	3411	12539	9179	22787
Baghpat	21.25	52.23	4.1	4.4	763	4517	3588	8647
Ghaziabad	36.60	55.97	6.5	7.3	4081	19361	11152	34591
G.B.Nagar	21.40	34.10	7.1	13.7	4984	56447	23288	165538

Table A5b. Statistics Related to Commercial Banking in Southern Upper Ganga Plains

District	Credit Deposit Ratio		No. of scheduled commercial banks per lakh of population		Per Capita Credits		Per Capita Deposits	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Bulandshahar	24.12	42.91	4.8	4.7	1031	4224	4274	9844
Aligarh	24.44	45.33	5.1	5.1	1701	5944	6201	13112
Hathras	32.82	72.20	5.2	5.9	1291	6237	3934	8638
Mathura	29.16	50.50	6.4	7.1	1807	7213	6199	14283
Agra	26.87	52.09	6.3	6.5	2486	12728	9271	24437
Firozabad	29.94	60.09	4.0	3.8	1109	4440	3702	7389
Etah	32.04	41.54	4.0	4.2	821	2708	2563	6519
Mainpuri	33.03	40.39	4.6	3.9	970	2646	2917	6552
Badaun	45.66	56.69	3.9	3.5	787	2236	1723	3944
Bareilly	30.17	47.85	5.0	5.3	1407	5197	4665	10861
Pilibhit	42.19	70.83	4.7	4.4	1076	3791	2551	5352
Shahjahanpur	39.89	59.73	4.7	4.5	1211	3751	3036	6279
Kheri	47.67	62.00	4.0	3.9	1099	3190	2306	5145
Farrukhabad	30.63	36.91	4.8	4.7	1116	3014	3645	8165
Kannauj	33.52	56.09	4.3	3.9	877	3249	2615	5793
Etawah	22.37	38.13	4.6	4.8	816	3717	3647	9747
Auraiya	16.55	28.94	4.2	4.4	419	1654	2535	5717

Table A5c: Statistics Related to Commercial Banking, in Central Region

District	Credit Deposit Ratio		No. of scheduled commercial banks per lakh of population		Per Capita Credits		Per Capita Deposits	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Sitapur	26.32	46.31	4.4	4.2	617	2255	2344	4869
Hardoi	28.80	48.35	3.8	3.7	614	2448	2132	5064
Unnao	18.15	31.88	4.2	3.9	594	2315	3274	7262
Lucknow	32.99	41.71	8.1	11.1	8768	37406	26580	89682
RaeBareli	19.11	32.45	4.6	4.7	626	2491	3277	7676
KanpurDehat	30.45	43.46	7.6	7.5	1098	3797	3607	8736
KanpurNagar	33.02	49.00	7.7	7.6	5029	17480	15231	35670
Fatehpur	20.14	30.99	4.6	4.0	523	1848	2598	5964
Barabanki	30.90	50.90	5.0	5.0	858	3381	2775	6643

Table A5d: Statistics Related to Commercial Banking inSouthern Region

District	Credit Deposit Ratio		No. of scheduled commercial banks per lakh of population		Per Capita Credits	Per Capita Deposits		
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Jalaun	28.28	58.49	5.6	5.4	887	4509	3138	7708
Jhansi	24.93	35.60	5.6	6.4	1633	6106	6550	17150
Lalitpur	31.98	60.41	4.5	4.1	762	3580	2383	5926
Hamirpur	36.01	67.13	5.4	5.1	814	4217	2260	6281
Mahoba	29.82	65.75	4.8	4.6	737	4461	2471	6785
Banda	34.20	48.26	5.5	5.2	727	3255	2126	6746
Chitrakoot	32.26	43.35	4.9	4.5	676	2342	2094	5403

Table A5e: Statistics related to Commercial Banking in Eastern Region

District	Credit Deposit Ratio		No .of scheduled commercial bank per lakh of population		Per Capita Credits		Per Capita Deposits	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Pratapgarh	16.97	19.91	4.8	4.4	587	1512	3457	7594
Kaushambi	22.53	25.55	3.7	3.8	430	1262	1910	4938
Allahabad	18.31	24.21	5.0	5.2	1420	4213	7756	17400
Faizabad	22.36	29.19	4.1	4.2	1006	2886	4499	9885
Ambedkar Nagar	22.61	31.41	3.7	3.4	611	1757	2703	5596
Sultanpur	23.07	29.86	4.5	4.3	939	2190	4068	7332
Bahraich	34.44	49.73	4.2	3.9	688	2588	1999	5204
Shrawasti	30.50	48.07	4.5	4.2	447	2091	1464	4350
Balrampur	24.75	27.17	4.0	4.0	661	1810	2670	6661
Gonda	22.63	31.08	3.9	4.1	660	2173	2915	6992
Siddharth Nagar	23.76	28.24	4.0	3.6	495	1479	2083	5236
Basti	33.56	28.68	4.3	4.1	1058	2130	3153	7426
Sant Kabir Nagar	20.90	22.97	3.8	3.8	460	1293	2201	5631
Mahrajganj	28.69	35.04	3.6	3.2	609	1606	2123	4583
Gorakhpur	23.75	30.43	4.8	5.1	1551	5488	6531	18032
Kushinagar	30.96	29.36	3.3	3.1	718	1586	2319	5401
Deoria	18.81	22.54	3.9	3.7	751	1835	3991	8142
Azamgarh	12.40	20.14	4.5	4.4	531	1769	4281	8783
Mau	12.02	17.56	4.2	3.9	500	1495	4156	8514
Ballia	14.17	21.84	5.1	4.6	649	2068	4580	9465
Jaunpur	16.61	17.63	4.6	4.3	752	1639	4527	9297
Ghazipur	13.52	21.51	4.8	4.6	593	1945	4386	9046
Chandauli	22.99	27.38	3.4	3.5	741	1788	3222	6530
Varanasi	26.75	27.45	6.4	6.8	2993	7808	11195	28449
Sant Ravidas Nagar	51.36	40.98	4.1	3.7	2982	3971	5805	9691
Mirzapur	35.98	31.59	4.5	4.3	1339	2438	3722	7717
Sonbhadra	26.46	19.39	4.5	4.0	1342	2564	5073	13227

Table A6a: Statistics related to Cooperatives, in Northern Upper Ganga Plains

District	No. of cooperative agricultural marketing centres per lakh of population		No. of cooperative marketing societies per lakh of population		No. of primary agricultural credit societies per lakh of rural population		No. of joint agricultural cooperative societies per lakh of population	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Saharanpur	1.36	1.29	0.24	0.15	3.72	4.94	1.33	0.83
Muzaffarnagar	0.95	0.79	0.11	0.10	2.71	3.64	0.98	0.07
Bijnor	1.85	0.93	0.12	0.11	3.06	4.14	1.94	0.98
Moradabad	2.82	2.24	0.16	0.09	2.42	3.87	1.06	0.35
Rampur	5.98	2.48	0.15	0.13	3.32	4.45	3.32	2.88
Jyotiba Phule Nagar	1.86	1.63	0.00	0.13	3.60	3.98	1.73	1.57
Meerut	1.23	0.35	0.23	0.12	3.89	5.36	1.06	0.06
Baghpat	-	0.08	0.17	0.16	3.85	3.85	-_	0.08
Ghaziabad	0.03	0.26	0.12	0.07	1.91	4.14	0.39	-
G.B.Nagar	2.93	1.46	0.25	0.20	3.27	4.51	2.10	1.86

Table A6b: Statistics related to Cooperatives, Southern Upper Ganga Plains

District	No. of cooperative agricultural marketing centres per lakh of population		No .of cooperative marketing societies per lakh of population		No. of primary agricultural credit societies per lakh of rural population		No. of joint agricultural cooperative societies per lakh of population	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Bulandshahr	3.79	3.37	0.37	0.28	4.96	6.67	1.33	_
Aligarh	2.50	1.24	0.23	0.14	3.41	5.31	0.90	0.08
Hathras	3.14	2.38	0.23	0.22	6.97	7.68	-	-
Mathura	2.56	1.21	0.19	0.17	3.72	5.31	1.11	_
Agra	0.80	0.56	0.13	0.09	2.85	5.01	0.80	0.63
Firozabad	1.46	1.01	0.10	0.08	3.91	5.62	0.44	0.40
Etah	3.90	3.47	0.17	0.16	3.72	4.43	0.57	0.03
Mainpuri	3.76	2.51	0.25	0.17	3.76	4.48	1.44	0.50
Badaun	6.32	3.95	0.13	0.11	5.27	6.45	0.19	0.03
Bareilly	2.97	1.72	0.08	0.07	3.94	5.85	0.91	0.60
Pilibhit	9.61	5.08	0.30	0.16	4.31	5.63	2.37	1.50
Shahjahanpur	6.19	4.44	0.16	0.13	4.54	5.64	1.56	0.07
Kheri	3.65	3.95	0.21	0.18	4.03	4.55	1.06	0.52
Farrukhabad	4.18	3.68	0.31	0.22	4.43	5.66	1.26	0.17
Kannauj	2.95	3.04	0.28	0.19	3.46	4.17	1.01	0.97
Etawah	3.43	3.84	0.29	0.20	4.47	5.82	1.11	0.13
Auraiya	5.08	3.85	0.25	0.31	6.69	7.82	0.17	0.08

Table A6c: Statistics related to Cooperatives in Central Region

District	No. of cooperative agricultural marketing centres per lakh of population		No. of cooperative marketing societies per lakh of population		No. of primary agricultural credit societies per lakh of rural population		No. of joint agricultural cooperative societies per lakh of population	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Sitapur	1.79	1.40	0.13	0.12	5.64	6.41	0.80	0.57
Hardoi	2.64	1.49	0.11	0.13	5.76	6.55	0.73	0.52
Unnao	1.70	0.91	0.11	0.07	6.62	7.82	0.77	0.42
Lucknow	0.76	0.56	0.05	0.04	2.58	7.62	0.07	1.44
RaeBareli	2.15	1.59	0.13	0.15	6.44	7.12	0.73	0.64
KanpurDehat	4.41	2.35	0.37	0.17	6.12	6.70	1.57	1.29
KanpurNagar	0.72	0.68	0.02	0.08	2.17	6.59	0.07	0.02
Fatehpur	2.81	1.12	0.17	0.15	4.98	5.56	1.21	1.00
Barabanki	1.75	1.91	0.07	0.06	5.72	6.31	0.63	0.45

Table A6d. Statistics related to Cooperatives in Southern Region

District	Southern Region							
	No. of cooperative agricultural marketing centres per lakh of population		No. of cooperative marketing societies per lakh of population		No. of primary agricultural credit societies per lakh of rural population		No. of joint agricultural cooperative societies per lakh of population	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Jalaun	1.78	2.16	0.41	0.37	14.35	6.10	1.09	0.99
Jhansi	1.31	0.81	0.34	0.30	3.37	5.73	1.71	1.52
Lalitpur	1.84	2.07	0.20	0.17	4.19	4.91	2.04	1.38
Hamirpur	1.34	0.87	0.67	0.35	4.70	5.41	1.05	_
Mahoba	0.84	1.00	0.42	0.37	5.50	7.58	_	_
Banda	0.93	0.78	0.26	0.18	3.19	3.74	1.59	0.36
Chitrakoot	1.24	1.34	0.12	0.10	4.99	5.66	2.87	1.85

Table A6e. Statistics related to Cooperatives inEastern Region

District	No. of cooperative agricultural marketing centres per lakh of population		No. of cooperative marketing societies per lakh of population		No. of primary agricultural credit societies per lakh of rural population		No. of joint agricultural cooperative societies per lakh of population	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Pratapgarh	1.17	1.61	0.11	0.10	6.38	6.74	0.73	0.64
Kaushambi	0.23	1.31	0.15	0.15	5.94	5.32	_	_
Allahabad	0.97	0.73	0.14	0.10	3.92	5.56	0.60	0.51
Faizabad	1.91	1.83	0.14	0.04	3.78	4.37	0.67	0.17
Ambedkar Nagar	2.07	2.77	0.10	0.09	5.23	5.74	0.25	0.13
Sultanpur	0.75	0.79	0.06	0.05	5.79	6.09	0.37	0.11
Bahraich	2.68	2.20	0.16	0.14	6.50	5.13	0.83	_
Shrawasti	1.44	1.68	0.09	_	4.99	3.94	_	_
Balrampur	1.24	1.72	0.18	0.16	4.00	4.00	0.18	0.16
Gonda	2.09	2.13	0.21	0.09	8.20	6.46	0.68	0.50
Siddharth Nagar	1.86	2.37	0.20	0.17	6.22	6.47	0.15	0.08
Basti	3.19	2.07	0.24	0.04	5.22	5.94	0.87	0.17
Sant Kabir Nagar	3.22	3.47	_	0.06	5.82	6.28	_	_
Mahrajganj	4.70	4.49	0.14	0.16	4.43	4.67	_	_
Gorakhpur	2.72	2.55	0.18	0.12	5.04	6.27	0.44	0.35
Kushinagar	3.07	1.38	0.21	0.18	4.97	5.22	_	0.09
Deoria	3.58	4.10	0.14	0.29	6.81	7.56	0.76	0.67
Azamgarh	0.98	0.99	0.02	0.13	7.03	6.90	0.58	0.02
Mau	2.16	2.95	0.21	0.23	5.67	6.17	0.70	0.60
Ballia	1.67	1.26	0.18	0.16	5.99	6.65	1.08	0.87
Jaunpur	1.20	0.97	0.12	0.11	5.31	6.27	0.84	0.74
Ghazipur	0.85	1.24	0.13	0.20	5.96	6.46	0.95	0.34
Chandauli	1.15	2.90	0.06	0.16	5.06	5.65	_	0.52
Varanasi	0.69	0.41	0.19	0.11	2.98	5.00	1.20	0.66
Sant Ravidas Nagar	0.66	0.70	0.07	0.06	3.84	4.41	0.07	_
Mirzapur	1.60	1.70	0.23	0.12	4.11	4.70	1.51	0.85
Sonbhadra	1.02	1.45	0.14	0.11	4.16	5.39	_	0.11

Table A7a. Statistics related to Rural Development in Northern Upper Ganga Plain

District	No .of cooperative agricultural and rural development banks per lakh population		No. of cooperative cold storages pert housandsq.km. area		No of Cooperative processing plants per lakh of population		No .of agricultural marketing centres per lakh hect. NSA	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Saharanpur	0.21	0.18	_	_	0.07	0.09	14.26	15.27
Muzaffarnagar	0.19	0.17	0.25	0.25	_	_	10.41	9.79
Bijnor	1.94	0.22	_	_	_	0.03	17.15	10.22
Moradabad	0.13	0.13	0.78	0.54	_	_	33.20	32.33
Rampur	0.31	0.27	_	0.42	0.10	0.09	59.92	28.98
JyotibaPhuleNagar	0.26	0.25	0.46	0.44	_	_	16.36	15.10
Meerut	0.13	0.12	0.17	1.16	_	_	11.83	6.03
Baghpat	0.17	0.16	_	_	_	_	..	0.91
Ghaziabad	0.15	0.12	0.50	0.87	_	0.02	20.25	7.64
G.B.Nagar	0.08	0.13	_	_	_	_	12.80	26.78

Table A7b. Statistics related to Rural Development in Southern Upper Ganga Plains

District	No .of cooperative agricultural and rural development banks per lakh population		No. of cooperative cold storages pert housandsq.km. area		No of Cooperative processing plants per lakh of population		No .of agricultural marketing centres per lakh hect. NSA	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Bulandshahr	0.23	0.22	0.87	0.69	0.03	0.03	38.74	36.63
Aligarh	0.23	0.20	1.08	0.82	0.03	_	24.98	14.56
Hathras	0.29	0.30	_	0.54	_	0.07	28.84	21.60
Mathura	0.28	0.25	0.30	0.30	_	0.04	19.68	10.75
Agra	0.22	0.21	_	_	_	_	10.05	8.50
Firozabad	0.14	0.24	_	_	_	_	17.05	13.81
Etah	0.25	0.31	0.67	0.67	_	0.06	33.80	33.71
Mainpuri	0.25	0.28	0.73	0.72	_	0.11	32.28	24.66
Badaun	0.32	0.28	0.39	0.19	0.03	0.14	46.86	33.57
Bareilly	0.25	0.24	0.24	0.24	0.03	0.10	32.42	22.01
Pilibhit	0.24	0.31	0.57	0.57	0.12	0.16	70.88	41.00
Shahjahanpur	0.39	0.37	0.22	0.22	0.04	0.03	43.43	38.00
Kheri	0.21	0.23	0.26	0.26	_	0.05	24.29	31.33
Farrukhabad	0.19	0.22	2.33	1.83	_	0.11	39.99	44.41
Kannauj	0.21	0.19	_	0.48	_	0.13	28.23	32.73
Etawah	0.29	0.27	1.31	1.30	0.07	0.07	31.27	39.10
Auraiya	0.16	0.15	_	_	_	_	42.46	34.67

Table A7c: Statistics related to Rural Development in Central Region

District	No. of cooperative agricultural and rural dev. banks per lakh population		No. of cooperative cold storages pert housandsq.km. area		No of Cooperative processing plants per lakh of population		No .of agricultural marketing centres per lakh hect. NSA	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Sitapur	0.22	0.21	0.17	0.17	_	0.02	15.07	13.41
Hardoi	0.17	0.18	0.33	0.33	_	0.08	21.04	13.38
Unnao	0.18	0.16	0.22	0.22	_	0.07	15.41	9.19
Lucknow	0.10	0.09	_	_	_	_	19.69	17.90
RaeBareli	0.24	0.21	0.43	0.43	0.03	0.06	21.26	19.37
KanpurDehat	0.25	0.22	0.32	0.33	0.06	0.11	32.52	18.79
KanpurNagar	0.09	0.08	_	_	0.02	0.02	15.54	17.83
Fatehpur	0.17	0.15	0.48	0.48	0.13	0.19	22.16	10.04
Barabanki	0.22	0.19	0.51	0.45	_	_	18.58	23.19

Table A7d. Statistics related to Rural Development in Southern Region

District	No. of cooperative agri. and rural dev. banks per lakh pop.		No. of cooperative cold storages pert housandsq.km. area		No of Cooperative processing plants per lakh of population		No .of agricultural marketing centres per lakh hect. NSA	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Jalaun	0.27	0.25	_	_	0.14	0.19	7.54	11.02
Jhansi	0.22	0.20	_	_	0.06	0.05	6.97	5.27
Lalitpur	0.30	0.26	_	_	_	_	7.11	9.42
Hamirpur	0.28	0.26	_	_	0.10	0.09	4.31	3.89
Mahoba	0.28	0.25	_	_	_	_	2.75	4.28
Banda	0.19	0.18	_	_	_	_	4.12	3.87
Chitrakoot	0.12	0.10	_	_	_	_	5.74	7.59

Table A7e: Statistics related to Rural Development in Eastern Region

District	No .of cooperative agricultural and rural development banks per lakh population		No. of cooperative cold storages pert housandsq.km. area		No of Cooperative processing plants per lakh of population		No .of agricultural marketing centres per lakh hect. NSA	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Pratapgarh	0.18	0.16	0.81	0.81	_	_	14.47	22.95
Kaushambi	0.15	0.22	_	0.56	_	0.07	2.40	13.43
Allahabad	0.14	0.10	3.84	1.09	0.02	_	13.01	13.68
Faizabad	0.09	0.08	1.20	1.28	_	0.04	23.12	25.82
Ambedkar Nagar	0.14	0.13	0.40	0.43	_	_	25.06	39.48
Sultanpur	0.15	0.14	0.23	0.23	0.06	0.05	8.33	10.02

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District	No .of cooperative agricultural and rural development banks per lakh population		No. of cooperative cold storages pert housandsq.km. area		No of Cooperative processing plants per lakh of population		No .of agricultural marketing centres per lakh hect. NSA	
	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09	2000-01	2008-09
Bahraich	0.12	0.11	_	_	0.08	0.07	22.67	19.01
Shrawasti	0.08	0.07	_	_	_	0.07	9.94	17.08
Balrampur	0.17	0.16	_	_	_	0.05	10.46	15.52
Gonda	0.18	0.19	_	_	0.04	0.03	20.59	23.26
Siddharth Nagar	0.14	0.13	_	_	_	_	15.33	23.31
Basti	0.09	0.08	0.72	0.74	0.05	0.08	31.73	23.43
Sant Kabir Nagar	0.07	0.06	_	_	_	_	35.34	46.17
Mahrajganj	0.13	0.16	_	_	_	_	50.05	56.86
Gorakhpur	0.10	0.09	_	_	0.08	0.07	39.45	44.23
Kushinagar	0.10	0.09	_	_	_	_	39.96	20.90
Deoria	0.10	0.10	0.78	0.79	0.04	0.03	48.95	67.28
Azamgarh	0.17	0.15	1.18	0.49	_	_	12.86	14.86
Mau	0.16	0.14	_	1.75	0.05	0.09	31.02	51.08
Ballia	0.14	0.13	0.34	0.34	0.04	0.10	20.94	17.43
Jaunpur	0.12	0.11	0.99	0.99	_	0.07	16.13	15.41
Ghazipur	0.13	0.11	1.18	1.18	0.06	0.11	9.87	17.27
Chandauli	0.12	0.10	_	_	_	0.10	13.76	41.30
Varanasi	0.06	0.06	0.39	1.30	0.03	_	19.14	15.67
Sant Ravidas Nagar	0.07	0.06	_	_	_	_	12.77	16.29
Mirzapur	0.09	0.12	0.44	0.44	_	0.04	15.62	21.95
Sonbhadra	0.13	0.11	_	_	_	_	7.78	18.73

Demographic and Socio-Economic Analysis

in Lower Ganga Basin – I (Bihar)

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology


IIT Bombay


IIT Delhi


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Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Framework for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialogue in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. A list of persons who have contributed directly and names of those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction

The Ganga Basin constitutes 26 percent of the country's land mass and supports about 43 percent of population (448.3 million as per 2001 census).Livelihoods of a large number of people directly or indirectly depend on the resources of the river Ganga. In the backdrop of a very intense and perennial interrelationship between the river Ganga and its population base, it is important to dissect the components of population living in Ganga basin, their pattern of growth, composition, concentration, level of education, economic activities, health constraints etc. in order to prepare a holistic GRBMP.

There are many links between population growth and environmental degradation, in part, because an ever-increasing number of people depend on a fixed natural resource base for their livelihood. Demographic influences are one of many factors that affect water resource management and increase pressure on the water resource base.

For the effective and sustainable management of the basin, an understanding of growth and composition of population, sectoral composition of workforce, change in land use patterns, settlement patterns, health indicators livelihood patterns and their possible impact on the river water resources, inter alia, is imperative. Management of the basin is required to be viewed as a part of the broader environment and in relation to socio-economic demands and potentials, acknowledging the political and cultural context, as water is not only an economic resource but also a socio-cultural and environmental resource. Keeping these aspects in view, this report concentrates on the pattern of demographic and socio-economic status of people in the basin area[*] and its implications for the river basin management. A comprehensive report based on the demographic and socio-economic status of population in the basin area is divided into four parts as per the location of the river Ganga and the administrative setup. These are namely, pattern of demographic and socio-economic status of people in the Upper Ganga Basin (Uttarakhand), Middle Ganga Basin (Uttar Pradesh), and Lower Ganga Basin comprising separately for the states of Bihar and West Bengal respectively. This part of the report corresponds to the Lower Ganga Basin and discuses the pattern of demographic and socio-economic status of people in the state of Bihar.

The specific objectives of this report are as follows:

1. To conduct the demographic and socio-economic analysis of the Ganga Basin.
2. To study the implications of demographic and socio-economic trends in Bihar for the Ganga Basin.

The data sources, figures and facts documented and analyzed in the report are based on secondary data retrieved from various issues of Economic Survey reports, published by the Finance Department of Bihar, Statistical Handbook of Bihar published by the Directorate Of Economics & Statistics,

[*] The Ganga river basin area (as the term used in the report) is limited to four states i.e. Uttarakhand, Uttar Pradesh, Bihar, and West Bengal for the study purpose, as most of the activities related to the river Ganga are performed widely in these states.

Department of Planning & Development, Bihar, Patna, Annual Health Survey 2010 and the Census data published by Government of India, 2001 and also including the recent Census 2011 data.

This study deals with the overall socio-economic development of Bihar. The crucial indicators for the study of socio-economic development have been identified and a thorough study of their changing trends over the years has been done followed by graphical presentations of the indicators. The analysis has been done at two levels viz., the state level and the district level. Further, on the basis of their proximity to River Ganga, the districts have been divided, into two categories viz. 'bank districts' and 'non-bank districts'. The analysis focuses on the post-bifurcation period of Bihar i.e. from year 2000 and onwards. However, it may be noted that the analysis is limited to the availability of data for the select variables from 2000 to 2011[*]. All the district level information is presented in tabular form in the Appendix attached to this report.

2. Lower Ganga Basin: State of Bihar

Bihar occupies a significant place in the history of India for being the birth place of religions like Jainism and Buddhism. It is located between 21°-58'-10" N ~ 27°-31'-15" N latitude and between 82°-19'-50" E ~ 88°-17'-40" E longitude. Bihar is one of the oldest occupied places in the world, with a history spanning 3,000 years. There are numerous monuments spread throughout the state which depict the rich culture and heritage. Bihar is also known as the land of Nirvana. It witnessed the evolution of both the Buddha and the 24 Jain Tirthankaras. In Indian history, Bihar has seen the rise and fall of major empires. It has many tourist destinations, especially pilgrim centers like Patna, Bodhgaya, Rajgir, Vaishali and ruins of the world famous ancient university of Nalanda.

Bihar is situated in the eastern part of India. The city of Patna which is located on the banks of the holy Ganga, is the capital of Bihar. Bihar is the ninth largest state of India in terms of area (94,163 sq. km) and the third largest in terms of population (10.38 crores) in the country (Census of India, 2011). Bihar is bordered by Nepal in the north, West Bengal in the east, Uttar Pradesh in the west and Jharkhand in the south. The Bihar plain is divided into two parts by the river Ganga, which flows through the middle from west to east. The state has some of the most fertile lands of India. Central Bihar, south of the Ganga, is a region with rich agricultural resources. Most of North and Central Bihar is a plain.

Bihar falls in the Lower Gangetic plains. As per Planning Commission classification the state is divided into three geographic regions i.e. North Bihar Plains, South Bihar Plains and part of the Chhotanagpur Plateau. Approximately 76 percent of North Bihar Plains and 53 percent of South Bihar Plains are flood-prone while regions falling under Chhotanagpur Plateau are drought prone (Tankha,2009).

Bihar has 38 districts and 9 sub-divisions and these are shown in the map presented in Figure 1.. The state is well linked by roads, state highways, national highways, rural and district roads. The state has fairly good railway network connecting to almost all cities in India. There are airports at Patna and Gaya besides landing grounds in all major districts of the state. After the division of Bihar

[*] Data for Arwal district was unavailable for some variables as it was created in Sept.2001

in the year 2000, most of the industries were left in mineral-rich Jharkhand. The state retained almost 75 percent of the population, while it was left with only 54 percent of the land (Government of India and Government of Bihar, 2007).

INSTEAD OF THIS MAP, BETTER IF WE PRESENT A PHYSIOGRAPHIC MAP SHOWING THE GANGA AND OTHER FEATURES.



Figure 1: Map of Bihar

Note: Red marks indicate that the district is situated along river Ganga (bank districts).

Source: Developed from the map available at www.mapsofindia.com

From human and economic development perspective, Bihar lags behind other states in India. In terms of human development index, Bihar is at the lowest position amongst all Indian states. The state is ranked as the 7th poorest state with 42.56 percent of population below poverty line (Economic Survey Report, Government of Bihar, 2010-11). The total literacy rate of 64 percent for the state is much below the national rate of 74 percent. Overall male and female literacy rates in 2011 were 73 percent and 53 percent respectively (Census Data 2011). Other demographic indicators like high birth rate and population growth rate are discussed later in the report.

3. Demographic Characteristics

3.1. Trends in Population Growth

Demography is the study of various characteristics of human populations, such as size, growth density, birth rate, sex ratio, etc. Demographic analysis provides insights into the links between these characteristics and the cultural, economic, geographic and other social attributes present in a given area.

According to Census 2001, Bihar has a population density of 880 persons per sq. km, with 14 of its 38 districts having population densities higher than 1000 persons per sq. km. More than 90 percent of the people in 25 out of the 38 districts of Bihar lives in rural areas, making the state the least urbanized among all the major states in India. The population of Bihar has increased from about 82 million in 2001 to 104 million in 2011.

Table 1 shows an increasing trend in population of Bihar for the period 2001 to 2011. The population increased from 83 million in 2001 to 104 million in 2011. The decadal growth rate of populations however has fallen from 28% during 1991-01 to 25% during 2001-11.

Table 1: Population of Bihar (2001-2011)

Year	Total Population	Decadal growth rate, %
2001	82,998,509	28.43
2011	103,804,637	25.1

Source: Census of India 2001-2011

Figure 4 shows a regional variation in the decadal population growth rate over the period. During the decade of 1991-01 'non-bank districts' recorded comparatively higher growth rate of population than that of the 'bank districts'. However, the gap in growth rates reduced during the following decade.

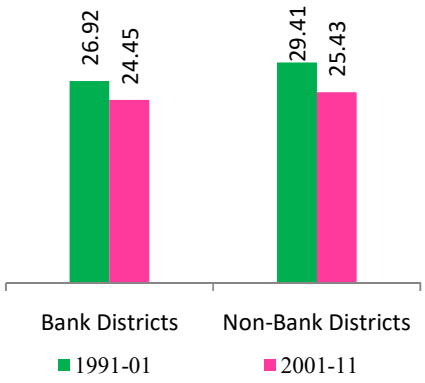


Figure 4: District Trends in Average Decadal Growth Rates in Population (%) of Bihar for 1991-01 to 2001-11

There are twenty two districts which recorded higher population growth rate than the state average of 25% during 2001-11 (Figure 5). Among these, there are number of districts which fall in the category of 'bank districts' viz., Vaishali, Begusarai, Bhagalpur, Khagaria, Katihar and Samastipur.

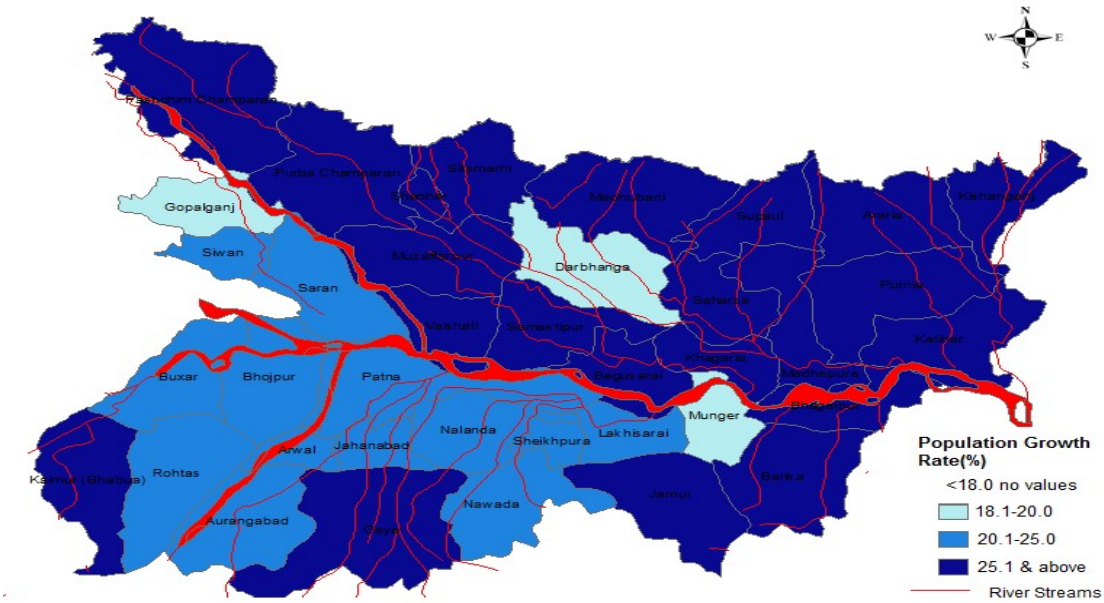


Figure 5: Decadal Population Growth Rate (%) across Districts of Bihar, 2001-11

3.2. Trends in Natural Growth Rate

Birth rate indicates the number of live births per 1,000 population in a reference period. Subtracting the death rate from the birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration. As shown in Figure 6, it is interesting to note that while the birth rate was showing declining trend, the death rate in the state fluctuated from 2000 till 2006 and then declined subsequently. This is reflected in the declining trend with the same pace for the natural growth rate ranging between 23 and 19 per 1000 population during 2000-2010. Since 2000-2002, the natural growth rate of population in the state was almost stable at 23 per 1000 population. It indicates that the consequent decline in natural growth rate since 2003 must have manifested into a sharp decline in the decadal growth rate during 2001-11.

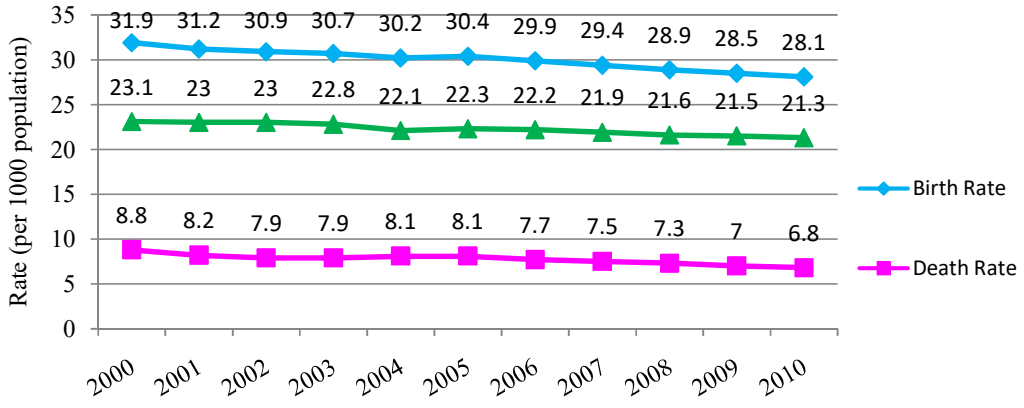


Figure 6: Birth, Death, and Natural Growth Rate (per 1000 population), Bihar, 2000-2010

(Source: The data was obtained from Bihar Statistical Handbook 2012 for the state of Bihar)

Figure 7 presents the birth, death, and the natural growth rates across the bank districts and non-bank districts of Bihar. Information on district wise birth and death rates were made available in Annual Heath Survey, 2010. During 2010-11, there was hardly any remarkable difference in indicators across the districts. However, the non-bank districts accounted for the highest birth and the death rates and accordingly the natural growth rates.

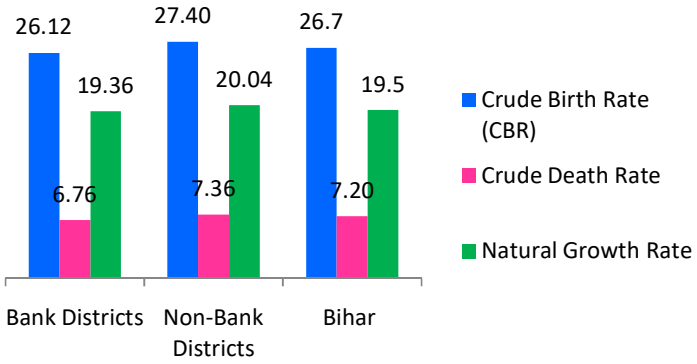


Figure 7: Birth, Death, and Natural Growth Rate (per 1000 population) across Districts of Bihar, 2010-11

3.3. Distribution of Population

Distribution of population refers to the allocation of state's total population by area of residence i.e. rural and urban, and the proportional distribution across regions and districts of Bihar. As shown in Figure 8, as per the Census 2011 an overwhelmingly large 89 percent population of the state lives in rural areas. In 2001 rural population was almost 90 percent. Urban population has recorded marginal increase of 1% which cannot be attributed to forces of urbanization or development of any significance.

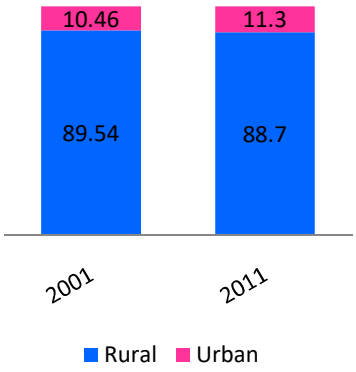


Figure 8: Distribution of Population by Place of Residence, Bihar, 2001-2011

3.4. Population Concentration

Population concentration characterizes the pattern of population distribution in an area. This is represented by the density of population in particular region, and is calculated in terms of persons

per unit area. Density of population suggests clustering, scattering, randomness or uniformity in the distribution of population, which further helps to assess the population pressure on particular area or resources.

As per Census 2011 Bihar with 1102 persons/sq km is the most densely populated state in the country. The second most densely populated state which is West Bengal is also in the Lower Ganga basin where the population density is 1029 persons/sq km. In comparison, the national average population density is only 382 persons/sq km. The significantly higher population densities signify severe pressure on the land and water resources in the Lower Ganga basin.

Figure 9 shows that in general the population density in 'bank' districts of Bihar is significantly higher than that in the 'non-bank' districts. There are 10 districts along river Ganga (namely Patna, Vaishali, Saran, Begusarai, Buxar, Bhagalpur, Khagaria, Katihar, Bhojpur and Samastipur) where population density is more than 1001 persons/sq. km. (Figure10). This signifies that, among others, more people are attracted to the 'bank districts' in search of livelihood. However, this may not be necessarily so in the case of Bihar as there are also several districts in the 'non-bank' category where population density in excess of 1001 persons per sq. km. has been recorded.

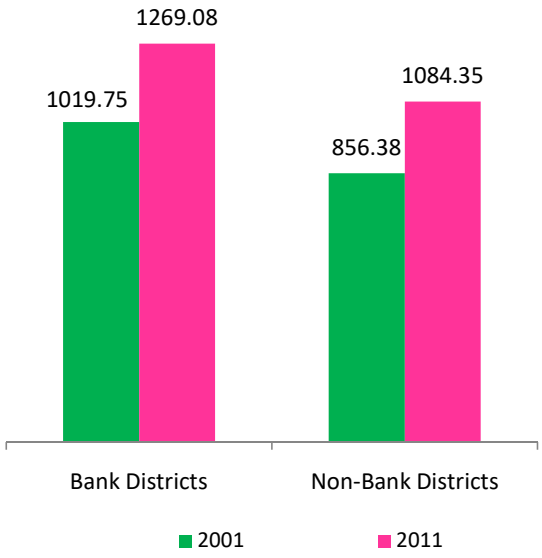


Figure 9: Average Population Density (persons/sq. km.) across Districts of Bihar, 2001-2011

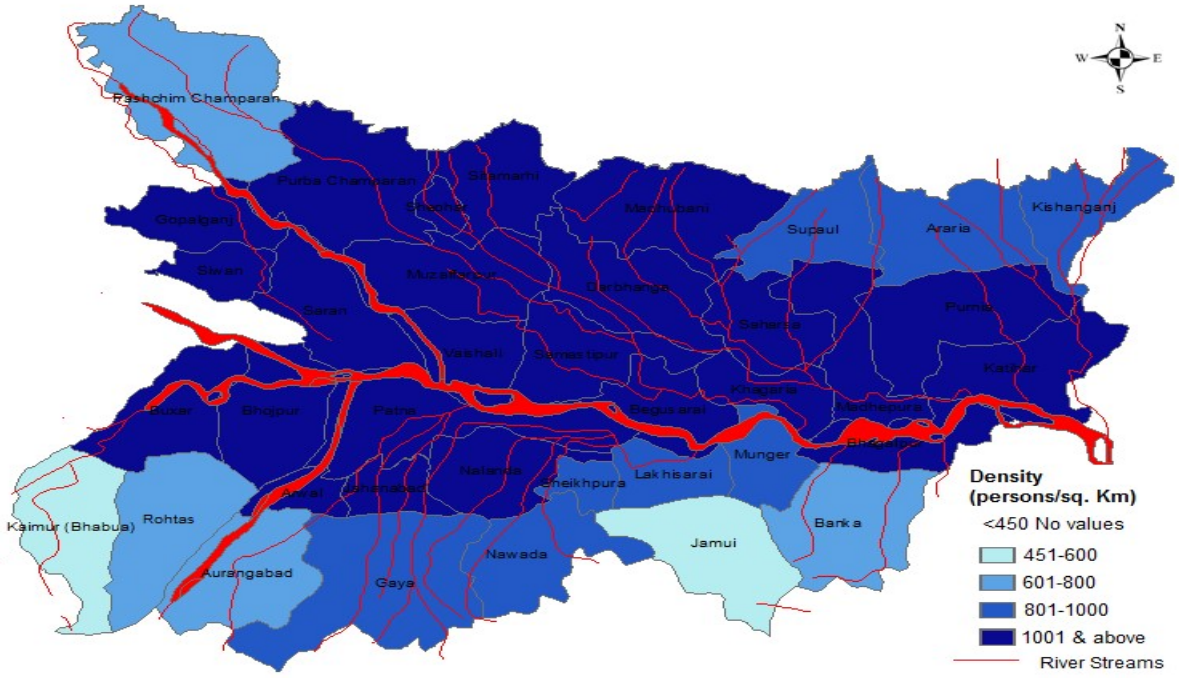


Figure 10: Population Density (Persons/sq. km.) across Districts of Bihar, 2011

3.5. Population Composition

Population composition refers to the demographic and the social composition of the population, which includes population in different age-groups, sex-groups, social groups, and the religious groups.

Figure 11 shows the percentage of population in various age groups with respect to males and females which are estimated based on data from the Sample Registration System for 2010. The Figure indicates that the age group of 15-59, which is considered to be the working age group had 55 percent females and 54 percent males. The age group of 60 and above had 6 percent males as well as 6 percent females.

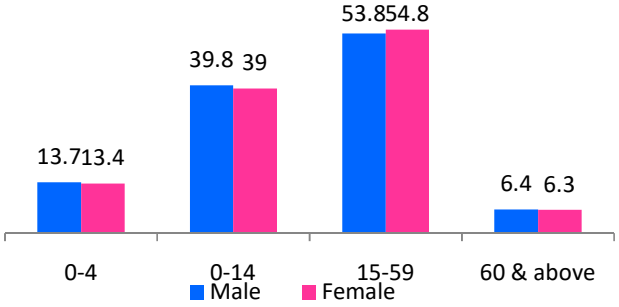


Figure 11: Population distribution by age and gender, Bihar, 2010

Figure 12 shows the sex ratio (number of females per 1000 males) in Bihar for the years 2001 and 2011. The sex ratio at 919 in 2001 was significantly higher than that in 2011. This indicates that

proportion of females has fallen substantially in 2011. In comparison to the national average sex ratio at 940 in the Census 2011, the state average is recorded at 916.

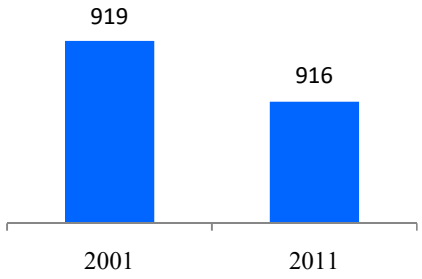


Figure 12: Trends in Sex Ratio (Female/1000 Male), Bihar, 2001-2011

Figure 13 shows regional difference in sex ratio for bank and non-bank districts. It is noted that sex ratio in non-bank districts is higher as compared to the bank districts. In absence of migration data this is difficult to explain, but could possibly be due to more livelihood opportunities in the bank districts.

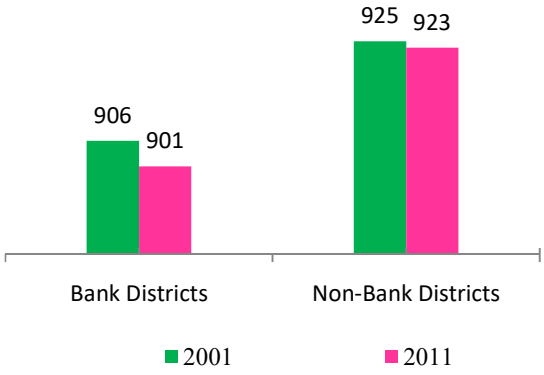


Figure 13: Average Sex Ratio (Female/1000 Male) across Districts of Bihar, 2001-2011

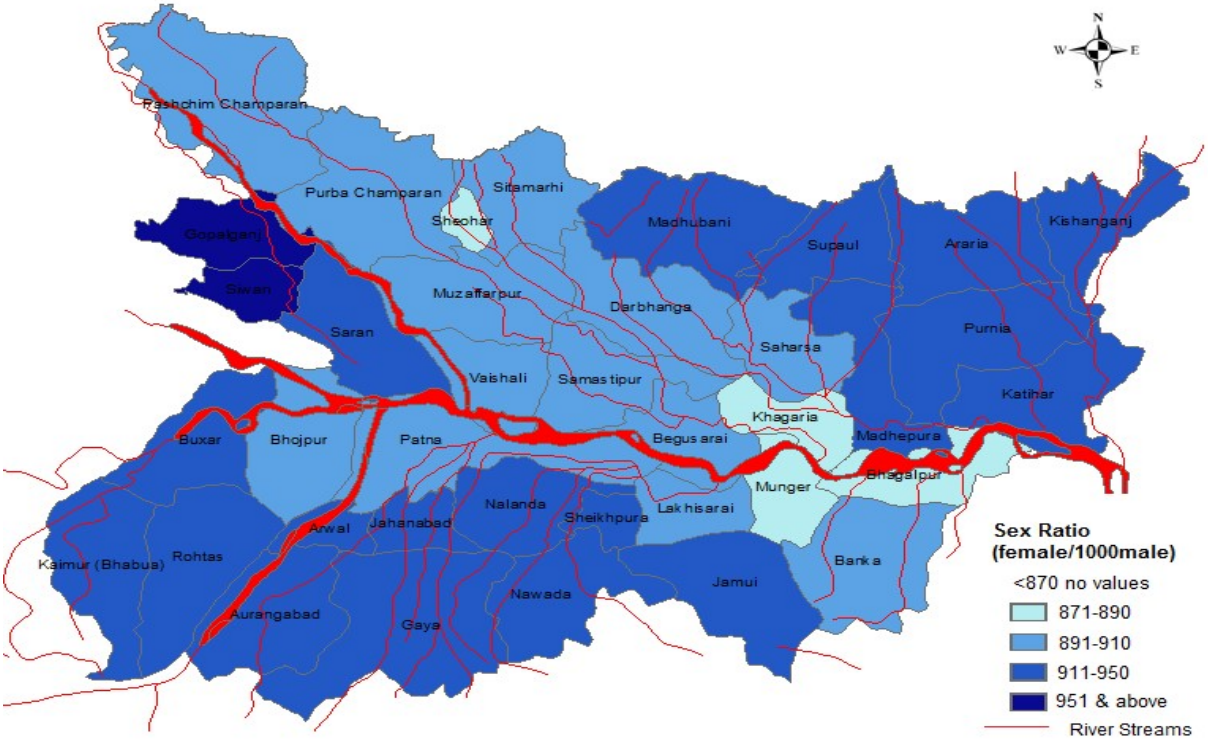


Figure 14: Sex Ratio (Female/1000 Male) across Districts of Bihar, 2011

Majority of the population in the state belongs to two main religious groups i.e. Hindu and Muslims. Figure 15 presents the proportion of population in different social group across regions of Bihar which is estimated from the 66th round of National Sample Survey (NSS) data. The bank districts reported 34 percent of the state's OBCs (Other Backward Castes) population, 34% of ST (Schedule Tribes) population and 32% of SC (Schedule Castes) population. Majority of SC population lives in non-bank districts (68%). Overall a majority of all three social groups is found to be residing in non-bank districts compared to bank districts.



Figure 15: Proportion (%) of Population by Social Group, Bihar, 2009-10

4. Economic Indicators

4.1. Gross State Domestic Product

Bihar's per capita income, which was about 60 per cent of the Indian average during early 1960s, declined to about 40 per cent in 1993-94 and further to 34 per cent in 1997-98. The GDP growth rate during the 1990s had been very low. The state was ranked among the slowest growing regions of India. The overall impact of the demographic situation along with slow growth led to the economic retrogression of the state (Sharma 2005).

However with the change of political alignments, in the recent past, the economy of Bihar has improved significantly. According to the Economic Survey of Bihar, 2010, the main growth sectors were construction, communication and trade/hotels/restaurants. The share of construction and trade/hotels/restaurants in Bihar's GSDP (Gross State Domestic Product) has gone up remarkably from 3.31% and 14.94% respectively in 2000-01 to 12.15% and 25.24% respectively in 2008-09. However, the share of agriculture went down during the same period from 35.83% to 23.58%. The contribution of manufacturing too recorded a slight drop from 5.67% in 2001-02 to 4.69% in 2008-09. The main reason behind the steady decline of agriculture lies in constant lack of investment and the prevalence of old agrarian practices.

Since Bihar is part of the Ganga Plains, the state has rich soil and abundant water resources. However, with the bifurcation of the state in November 2000, the newly created Jharkhand state took away the mineral rich part of the state and the present Bihar was left with its agro-based economy. During the first five years since 1999-2000, the economy grew at an annual rate of 3.50 percent. With the economic policies pursued by the new state government since 2005-06 which included higher levels of plan outlays, the economy has grown at an annual rate of 10.93 percent during 2004-05 to 2010-11 (Economic Survey 2010-11, Govt. of Bihar).

Figure 17 shows GSDP of Bihar over the 7 year period from 2004 to 2011. There has been a continuous high growth of GSDP for the state since 2004-05. From 2004-05, there has been no looking back for Bihar as the GSDP grew higher and higher, reaching Rs. 163.4 ('000 cores) in 2011-12, adding Rs. 85.6 thousand crore in eight years, with an average increase of approximately Rs.11 thousand crore every year.

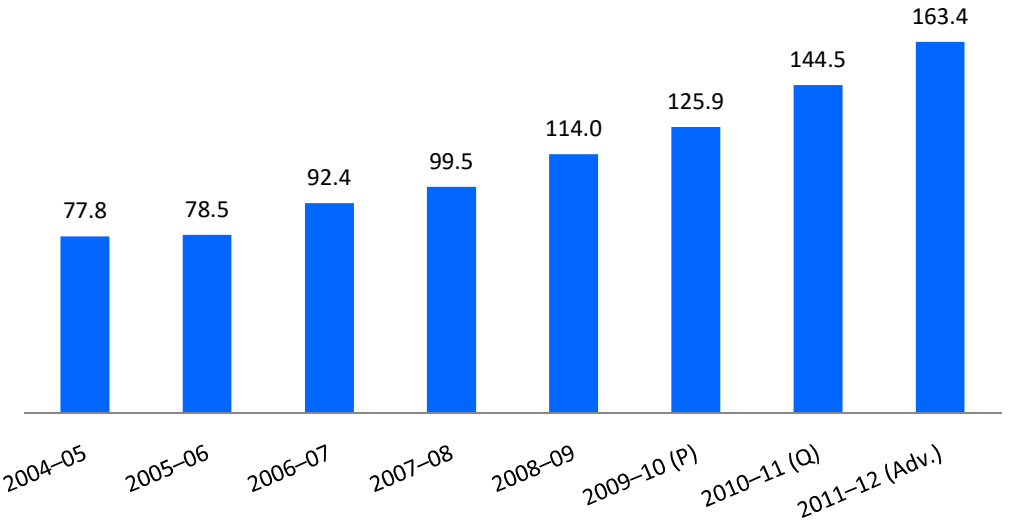


Figure 17: Gross State Domestic Product (Rs. '000 Crores), Bihar, 2004-2011 at Constant Prices (2004-05)

Note: P -Provisional, Q – Quick

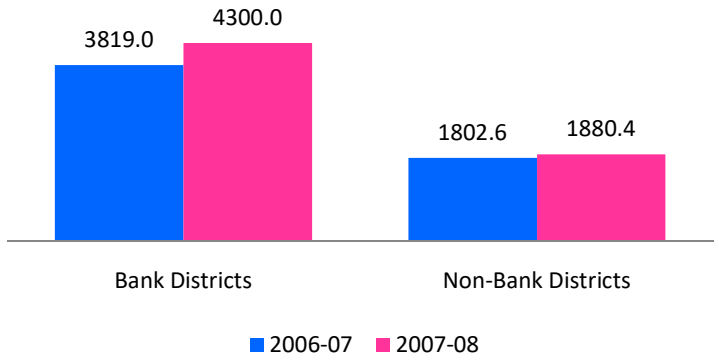


Figure 18: Average GDDP (Rs. Crore) across Districts of Bihar, 2006-2008 at 2004-05 Prices

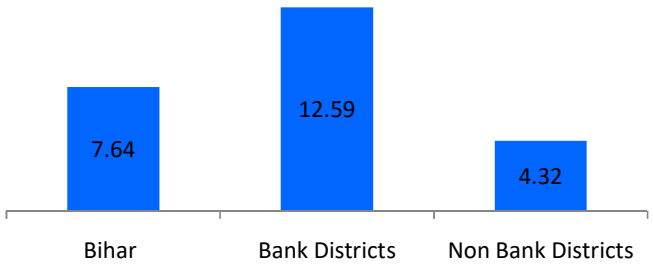


Figure 19: Region-wise CAGR (%) of GSDP and GDDP in Bihar, 2006-2007 to 2007-08

To sum up, the GSDP of Bihar grew with a rate of 7.64 percent during 2006-07 and 2007-08 (Figure 19). The average GDDP in bank districts appears to have recorded the highest annual growth rate of 12.59 percent during the same period, followed by the non-bank districts (4.32 percent).

4.2. Per Capita Gross Domestic Product

Figure 20 presents the trends in per capita GSDP of Bihar during 2004-05 to 2008-9. Over the period under consideration there has been an increase of around 40%.. Evidently this continuously rising trend represents positive momentum for the state economy.

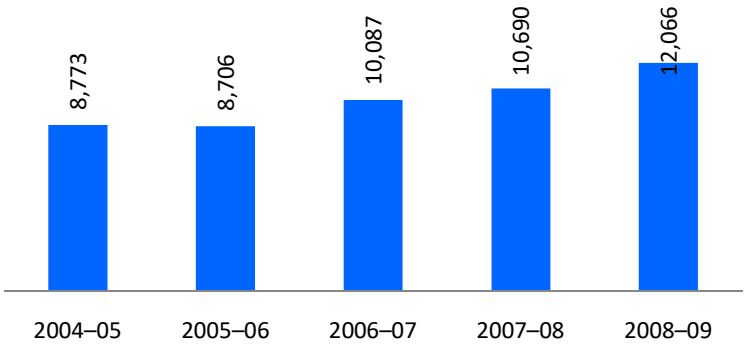


Figure 20: Per Capita GSDP (Rs.) of Bihar, 2004-2008 at 2004-05 Constant Prices

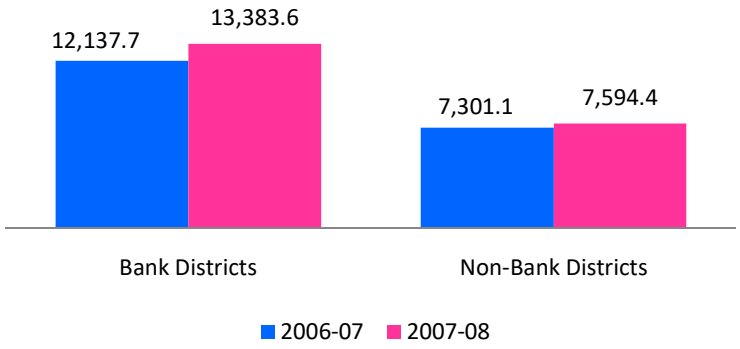


Figure 21: Average per Capita GDDP (Rs.) across Districts of Bihar, 2006-2008

In sync with the pattern of growth as observed in case of average GDDP across regions, the growth rate of per capita GDDP in the bank districts registered was much higher at 10.26 percent during the same period (Figure 22), compared to the non-bank districts (4.02 percent). Bihar's per capita GSDP recorded a growth rate of 6.80 percent.

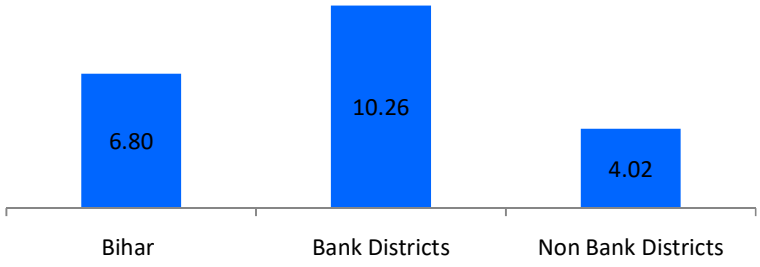


Figure 22: Growth Rate (%) of Per Capita GSDP and GDDP, 2006-07 to 2007-08

As illustrated in Figure 23, per capita GDDP is highest in Patna (Rs. 49,765) which is followed by Munger (Rs. 16,154) and Begusarai (Rs. 13,245). Except for Bhagalpur and Pashchim Champaran, per capita GDDP in the rest of the districts was less than Rs.10,000.

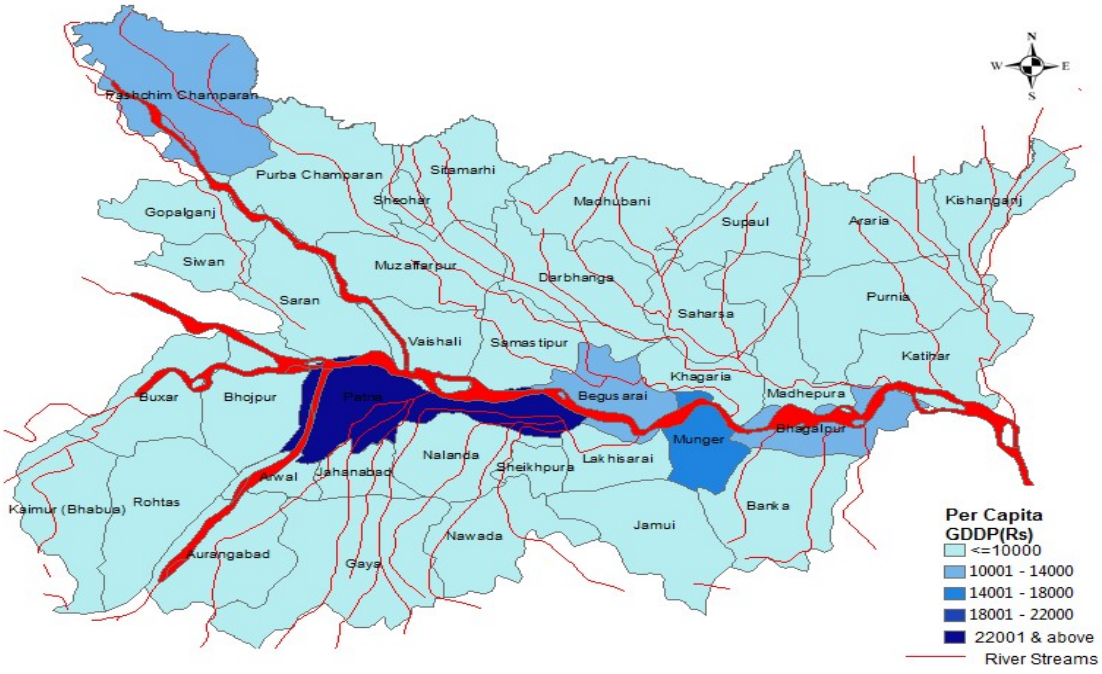


Figure 23: Per Capita GDDP (Rs.) across Districts of Bihar, 2007-08

4.3. Sectoral Composition of GSDP

Figure 24 presents the trend in the sectoral composition of GSDP of Bihar during 2000-01 to 2007-08. It is noted that the maximum contribution to GSDP was made by the tertiary sector and which has been rather stable throughout the period in the range of 50-57 percent. Primary sector was the second highest contributor to GSDP, though varying in a wide range and registering a significant decline from 39 percent in 2000-01 to 26 percent in 2007-08. Contribution of secondary sector also varied significantly from 10 percent in 2000-01 to 16 percent in 2007-08, however low values

indicate rather limited manufacturing activity in the state and thus the vulnerability of the state economy in general.

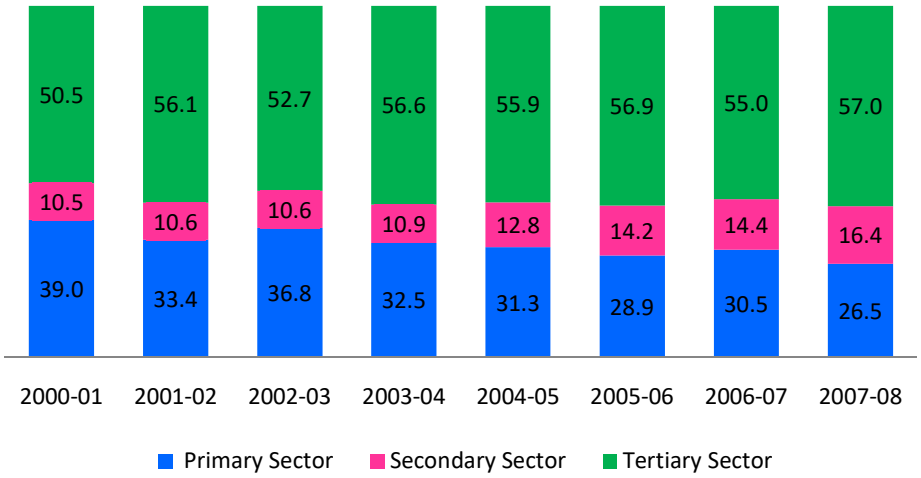


Figure 24: Sectoral Composition of GSDP (%) in Bihar, 2000-2007

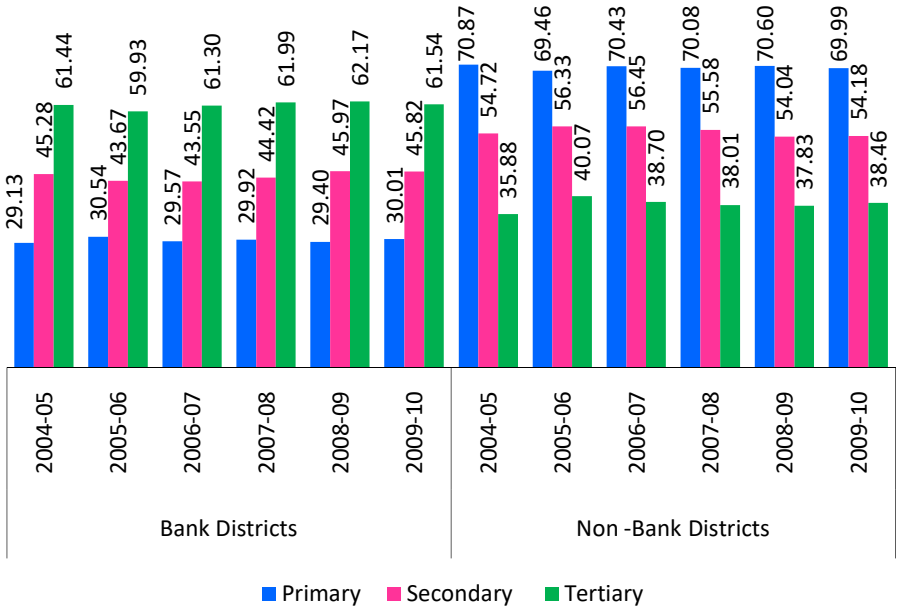


Figure 25: Bank and Non-Bank District's Share (%) in Sectoral Outputs in Bihar, 2004-09

As shown in Figure 25 above, bank districts contribute significantly through the tertiary sector while the non-bank districts make significant contribution through primary and secondary sectors. The trends of various sectors over the years are found to be rather stable.

As shown in Figure 26, tertiary sector had the maximum share in the bank districts' GDDP; the primary sector had the maximum share in non-bank districts' GDDP. The percentage shares of all

three sectors individually in both district-blocks remained almost constant throughout the given period.

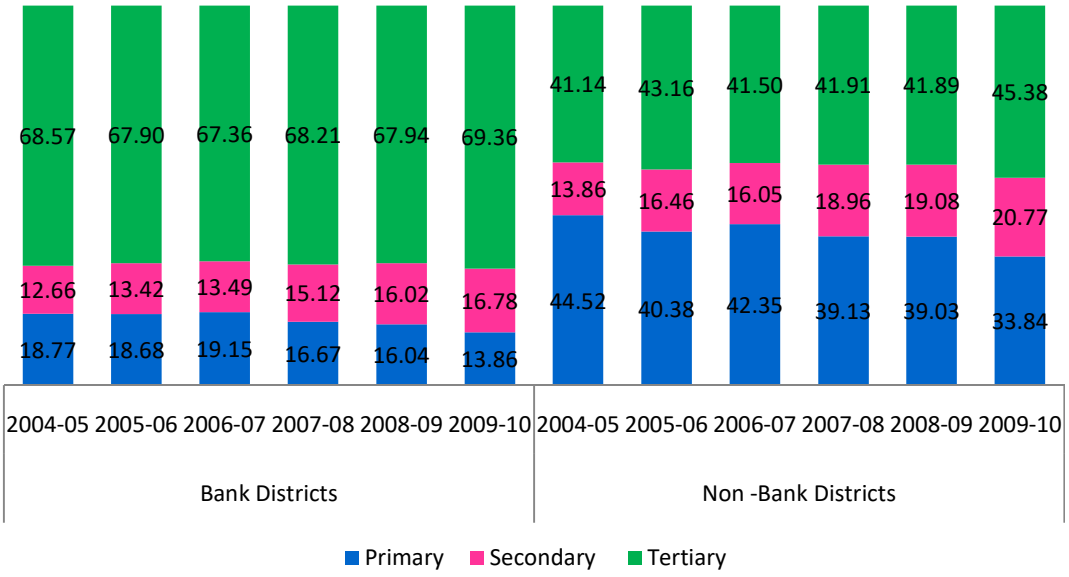


Figure 26: Region-wise Sectoral Composition of GDDP (%) in Bihar, 2004-2009

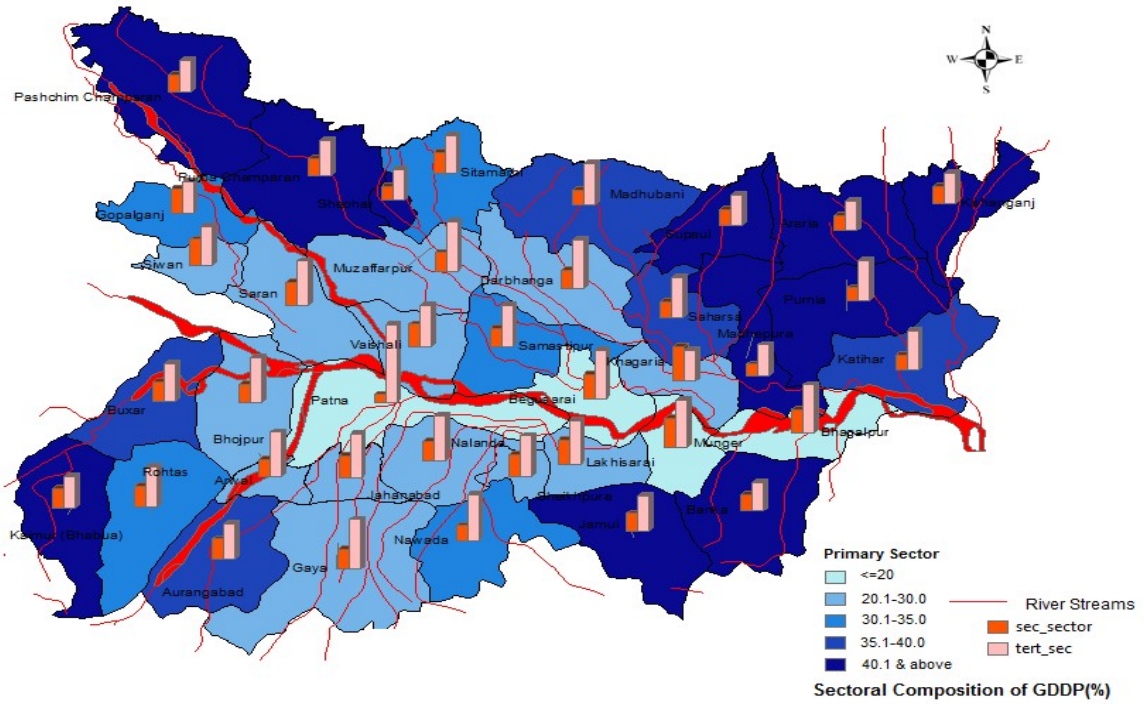


Figure 27: Sectoral Composition of GDDP (%) across Districts of Bihar, 2009-2010

Figure 27 presents the spatial distribution in sectoral composition of GDDP across districts of Bihar during 2009-10. The share of tertiary sector in comparison to other sectors in the GDDP appeared to be the maximum in all districts of the state. There were 4 districts which had recorded more than 55 percent share of tertiary sector in GDDP viz., Patna, Dharbhanga, Muzaffarpur and Gaya. On the other hand, Khagaria and Munger showed higher share of secondary sector in the GDDP between 33-39%.

4.4. Trends in Occupational Structure

Expansion in non-farm sector is one of the major ways of diversification of the rural economies. It is important due to inability of the agriculture sector to absorb the unemployed rural people. If we look at the economy of Bihar, agriculture is seen as the main source of livelihood. However, the cultivation at subsistence level is not able to provide sufficient income to the rural people and therefore they participate in other activities or migrate to other states. Non-farm sector constitutes of a whole range of activities from collecting tree twigs which is used as tooth brush to teaching in schools. However, most of the activities are traditional and low technology based. They have very poor linkage with agriculture or manufacturing in the urban areas. The tables 2 and 3 below present data on employment for 2004-05 and 2009-10 which are based on the NSSO reports.

Table 2: Per 1000 Distribution of Usually Working Persons in the Principal Status and Subsidiary Status taken together by Broad Industry Division (NIC 1998) for each state/union territory for the year 2004-05

	Agriculture	Mining and quarrying	Manufacturing	Electricity and water.	Construction	Trade, Hotel and restaurant	Transport	Fin. inter, business act, etc.	Pub Admin educn comm serv. etc	Total
Rural Male										
Bihar	758	1	50	1	32	87	28	3	40	1000
All-India	665	6	79	2	68	83	38	7	52	1000
Rural Female										
Bihar	864	0	81	0	0	26	0	0	28	1000
All- India	833	3	84	0	15	25	2	1	38	1000
Urban Male										
Bihar	172	2	112	3	78	355	78	55	145	1000
All- India	61	9	235	8	92	280	107	59	149	1000
Urban Female										
Bihar	467	0	148	0	0	120	1	4	259	1000
All- India	181	2	282	2	38	122	14	32	327	1000

Source:Employment Situation in India,NSSO 61st round 2004-05

From Table 2 it is noted that in 2004-05 most of the rural males and females are employed in agriculture sector. In rural areas the second highest area of livelihood for males is 'trade, hotel and restaurant' while for the females interestingly it is 'manufacturing'. In the urban areas, the area

offering highest livelihood opportunity for males is ‘trade, hotel and restaurant’ while agriculture is second and manufacturing is a distant fourth. Among urban females the agriculture offers the highest opportunities which is followed by ‘public administration education, etc.’

Table 3 below shows that in 2009-10, agriculture offered most livelihood opportunities for both male and female rural populations. In urban areas, construction sector offered most opportunities for male workers followed by ‘transport and communication’. A good sign is that a large number of urban females are moving towards education sector. This implies that female literacy has improved over the years in Bihar as a large number of females are opting to teach. Interestingly, among the rural females besides agriculture, manufacturing continues to be a popular livelihood options.

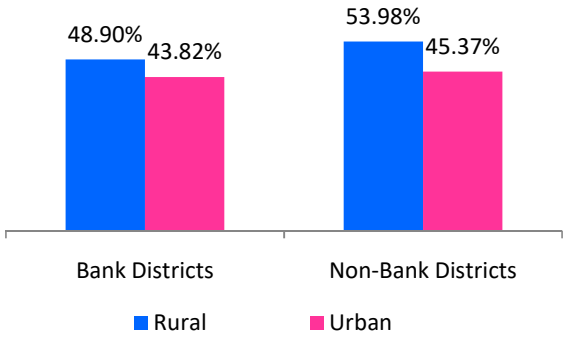
Table 3: Distribution (per 1000) of workers according to usual status approach by industry sections of NIC-2004 for 2009-10

	Agriculture, hunting and forestry	Fishing	Mining and quarrying	Manufacturing	Electricity, gas and water supply	Construction	Wholesale, retail trade, etc.	Hotels and restaurants	Transport, storage and communications	Financial intermediation	Real estate, renting and business activities	Public administration, defence, etc.	Education	Health and social work	Other community, social and personal service activities	Activities of private households	Extraterritorial organizations and bodies	All
Rural Male																		
Bihar	649	0	0	48	1	117	84	3	40	4	3	4	15	2	30	0	0	1000
All-India	623	5	8	70	2	113	72	10	41	3	4	12	15	3	15	3	0	1000
Rural Female																		
Bihar	830	0	0	82	0	5	19	2	10	0	0	0	26	0	25	1	0	1000
All-India	792	1	3	75	0	52	23	5	2	1	1	5	20	5	9	5	0	1000
Urban Male																		
Bihar	126	0	0	118	0	135	312	27	102	18	19	34	67	14	25	4	0	1000
All-India	57	3	7	218	7	114	239	31	104	27	45	57	36	15	30	9	0	1000
Urban Female																		
Bihar	352	0	0	105	47	0	119	71	0	1	0	56	109	12	35	93	0	1000
all-India	139	0	3	279	4	47	99	22	14	21	26	39	130	42	64	71	0	1000

Source: Key Indicators of Employment and Unemployment Situation in India, NSSO 66th Round, 2009-1

4.5. Population Below Poverty Line

The Figure 28 shows state population below poverty line for the year 2009-10. In general non-bank districts have higher fraction of people living below the poverty line compared to the bank districts. In both the regions, the fraction of BPL population in rural areas is higher than that in the urban areas.



*Rural Poverty Line: Rs. 655.6 per month Urban Poverty Line: Rs.775.3 per month

Figure 28: Average Population below Poverty Line (%) across Districts of Bihar,2009-10

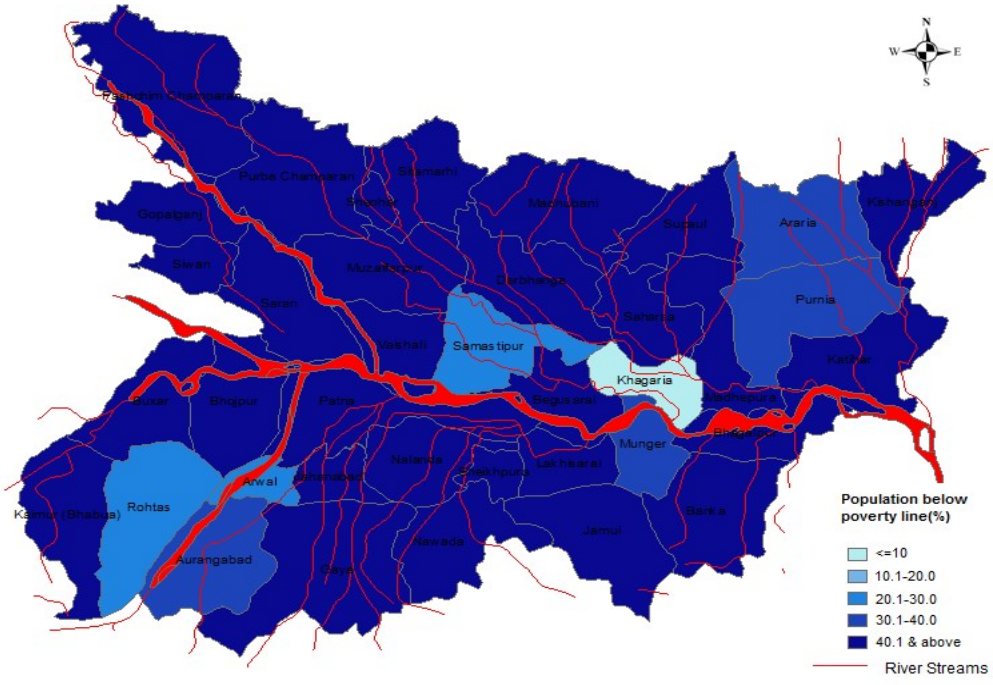


Figure 29: Population below Poverty Line (%) in Rural Areas across Districts of Bihar,2009-2010

Figure 29 shows the proportion of population living below poverty line in rural areas. The poverty line in rural areas was set at Rs. 655.6 per month. The Figure depicts that most districts suffer from the incidence of severe poverty. Khagaria was the only district which had poverty of 10.68 percent, which was the minimum. The top five districts with the highest proportion of population below poverty line were Nalanda (82%), Sitamarhi (76%), Pashchim Champaran (74%), Bhagalpur (72%) and Purba Champaran (68%).

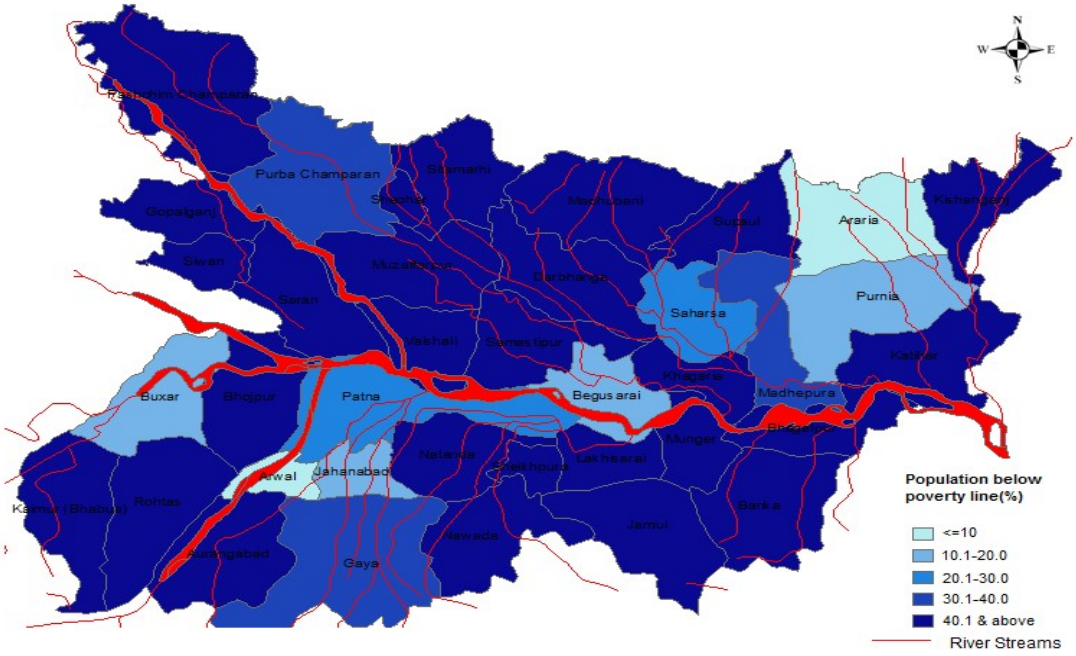


Figure 30: Population below Poverty Line (%) in Urban Areas across Districts of Bihar, 2009-2010

Figure 30 shows the proportion of population living below poverty line in urban areas. The poverty line in urban areas was set at Rs.775.3 per month. The Figure depicts that most parts of the state suffered from poverty. The top five districts with the highest proportion of population below poverty line were Bhojpur (81%), Siwan (75%), Sheohar (69%0, Nawada (65%) and Munger (63). Least proportion of urban population below poverty line is reported in Begusarai (11%) and Jehanabad (18%) respectively (data for Arwal and Araria were not available).

4.6. Trends and Pattern in Banking

In Bihar banking services are very limited and per capita availability of financial services is considered to be the lowest in the country. For uniform economic development across the state, there is an urgent need to expand the base of financial services with a particular focus on the rural economy and the small and medium enterprises. The expanded financial services must be cost effective and their delivery should be of high quality. The following banking facilities with the number of branches for each have been analyzed below.

- Commercial Banks (3942)
- Co-operative Banks (293)
- Regional Rural Banks (1451)
- Microfinance

1) Commercial Banks

A commercial bank (or business bank) is a type of financial institution and intermediary. It is a bank that provides transactional, savings and money market accounts and accepts time deposits.

At the end of March 2010, 57.7 percent of the total 4156 branches of commercial banks in Bihar were located in rural areas, 22.45 percent in semi-urban and 19.83 percent in urban areas (Economic Survey of Bihar 2012). The total number of branches increased substantially (5.43 percent) during 2010. This expansion has been a welcome break from the stagnation noticed till 2007 in the state. However, out of 214 new branches, all but 44 were opened in either urban (90 branches) or semi-urban areas (102 branches) and most of these were opened by private non-nationalized banks. Over the years urban branches have been consistently increasing their share from 15.13 percent in 2005 to 19.83 percent in 2010; likewise share of semi-urban branches has also increased from 20 percent to 22.45 percent during the same period (Economic Survey of Bihar, 2010).

Figure 31 shows distribution of urban, semi-urban and rural commercial banks for the period 2001-2010. Since 2001, the number of rural banks has declined, although the total number of branches has increased in the 10 years period. In the year 2010, the number of commercial banks in the rural areas declined while that in the semi-urban and the urban areas increased. These changes are attributed to the impetus to the state economy after the new political establishment which is giving significant thrust to overall development.

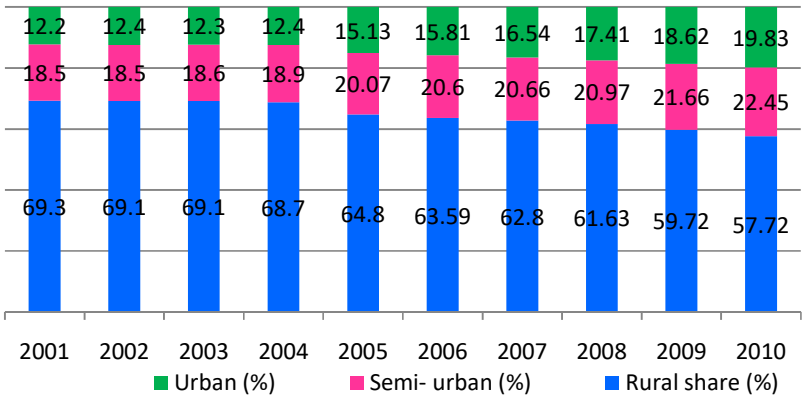


Figure 31: Distribution of Number of Urban, Semi-urban and Rural Commercial Banks in Bihar

As regards the credit to deposit ratio, it is noted from Table 4 that in non-bank districts there is comparatively higher credit demand than in the bank districts. However, the CD ratio is by and large in the range of 29-36%.

Table 4: Credit Deposit (CD) Ratio of Commercial Banks, Bihar, 2005-2011

Region	District wise CD Ratio						
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12 (Sep, 11)
Bank Districts	32.9	34.3	32.2	29.0	31.0	32.1	31.4
Non-Bank Districts	34.6	35.7	34.7	31.7	34.5	36.6	36.0

Note: Figures for the regions represent the average value of districts in that particular region.
Source: Economic Survey of Bihar, 2011-12

An analysis of district-wise pattern of credit-deposit ratio (CDR) during 2011-12 reveals that Kishanganj (53%) and Purnia (50%) recorded the highest, followed by Kaimur (49%) and Araria (49%). On the other hand lowest CDR was recorded in Siwan (21%), followed by Lakhisarai (23%), Bhojpur (23%) and Saran (23%).

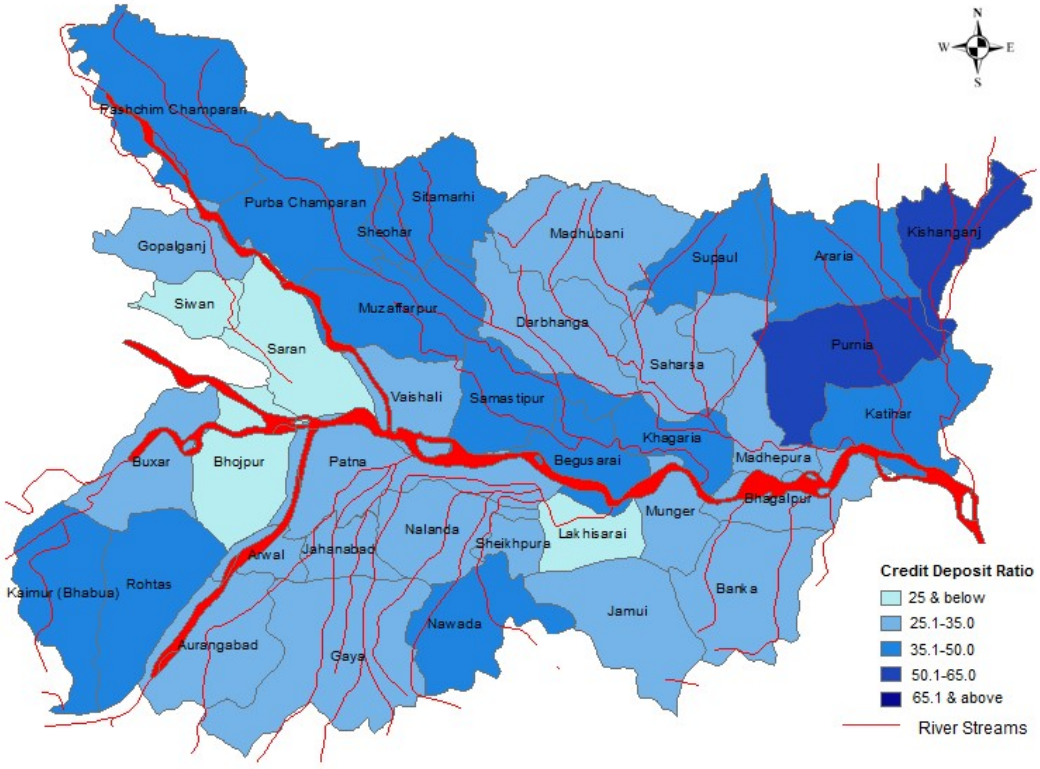


Figure 32: Credit Deposit Ratio (%) across Districts of Bihar, 2011-12

2) Cooperative Banks

Co-operative banks are small sized units organized in the co-operative sector which operate both in urban and non-urban centers. These banks are traditionally centered on communities, localities and work place groups and they lend to small borrowers and businessmen.

Co-operative banks function on the basis of 'no-profit no-loss' and therefore do not pursue the paradigm of profit maximization. As a result such banks do not focus on offering more than the basic banking services. Co-operative banks finance small borrowers in industrial and trade sectors, besides the professional and salaried classes. During 2008-09 there were only 14 state co-operative banks and 279 district central cooperative banks across the state. respectively.

3) Regional Rural Banks (RRBs)

The rural deposits of the scheduled commercial banks constituted only 24 percent of the total bank deposits in Bihar in 2007-2008. The deposits of RRBs were about 28 percent of the total rural deposits of all scheduled commercial banks in India as on December 2009, but in Bihar these were nearly 43 percent. Bihar accounted for about 6 percent of all rural deposits of the scheduled commercial banks in the country in 2009-10 and the total amount of rural deposits of such banks in Bihar amounted to Rs. 24,192 crore. While the number of RRB branches increased from 1429 in 2007 to 1451 in 2009, the growth in their deposits has slowed down in 2009-10 (17 percent) compared to that in 2008-09 (23 percent) (Economic Survey of Bihar 2011, GOB).

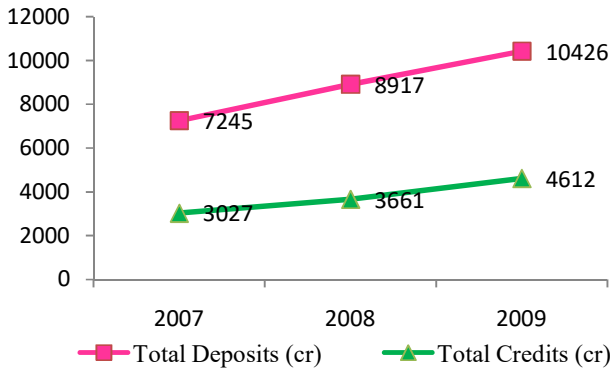


Figure 34: Branches and Deposits of Regional Rural Banks in Bihar

4) Microfinance

Microfinance is a type of financial service which provides banking and related services to the persons who have low income. The main objective of microfinance is to provide appropriate and high range of financial services such as credit, savings, and insurance and fund transfer to the poor people to help them to come out from poverty. In Bihar, a large segment of the population is under poverty line and microfinance is considered to be a good tool for

removing poverty. Through microfinance the weaker sections can easily access loans at an affordable rate which ultimately helps in the overall economic development of the society.

The self help groups (SHGS) and SHG-bank linkage programme implemented by the commercial banks, RRB's, co-operative banks are considered as the major microfinance programme in the country. Bihar is gradually catching up with other states in SHG bank linkages.

The year-wise distribution of the number of SHGs and the amount of credit for the period 2004-2011 across Bihar is shown in Figure 35. In 2004, there were 16,246 SHGs with bank linkage which increased 49,738 in 2007-2008, however in 2011 the number registered a significant decline and fell down to 7,287. Likewise the amount of credit in 2004 was Rs. 5,200 lakh which increased till 2009-2010 and then in 2011 it declined to Rs. 5,300 lakh. Till June 30, 2010, about 1,85,600 SHGs were credit-linked to various banks and the total credit flow to them was Rs. 1,003 crore.

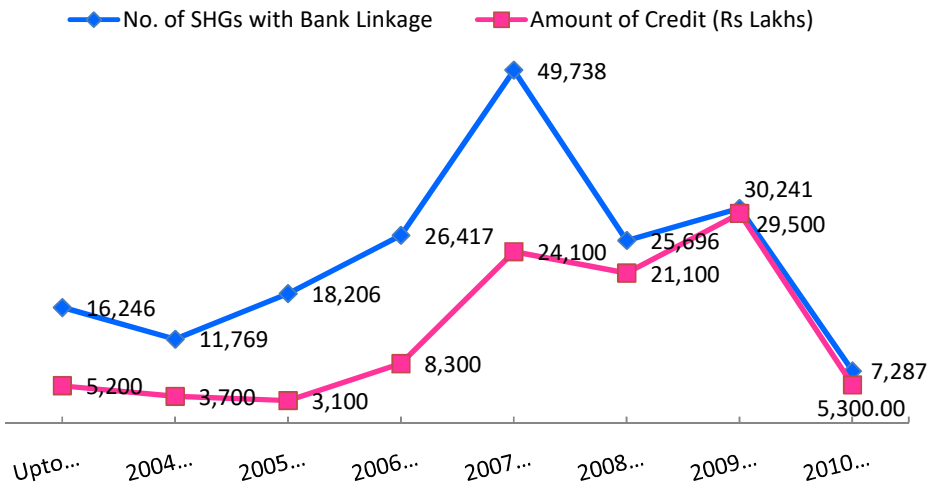


Figure 35: Year-wise Distribution of No. of SHGs & Amount of Credit

Compared to other states of India, the penetration of microfinance is insignificant in Bihar. This is attributed to, among others, skewed distribution of SHGs across the districts, weak infrastructure, increasing costs, low efficiency of operations, lack of experience and capacity among NGOs, conservative attitude of banks towards SHGs and fund constraints for start-ups, etc. If SHG movement has to reach out a larger section of the rural population then the above issues need to be addressed on priority.

5. Social and Health Components

5.1. Literacy

Bihar is characterized by comparatively lower level of literacy. For instance as per the Census 2011, against the national average of 74%, Bihar with 63.8% stands lowest among all the 28 states in the country. Present rate of literacy among male and female population is recorded to be 73 percent and 53 percent respectively. Figure 36 presents literacy rate of Bihar for 2001 and 2011 which brings out a gradual rise for the toal, male and female population. Female literacy rate which was very low in 2001 has reached respectable level of 53 % in 2011, however the gender gap is still quite significant. Interestingly, as shown in Figure 37 and 38 bank districts have fared better on literacy rate compared to the whole state as well as the non-bank districts. Further as illustrated in Figure 38, districts in south Bihar have recorded better literacy rates while those in the north are found to be lagging behind.

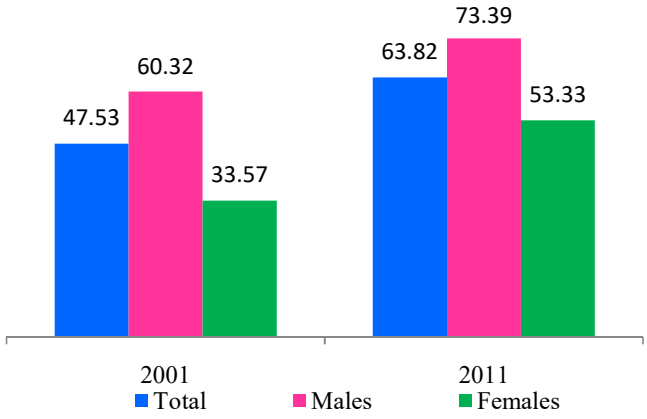


Figure 36: Literacy Rate (%), Bihar, 2001 and 2011

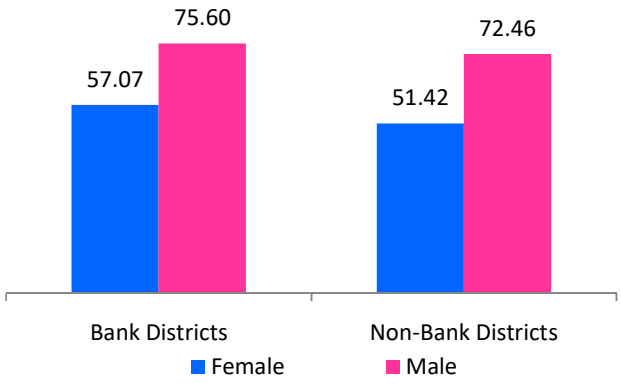


Figure 37: Literacy Rate (%) across Districts of Bihar, 2011

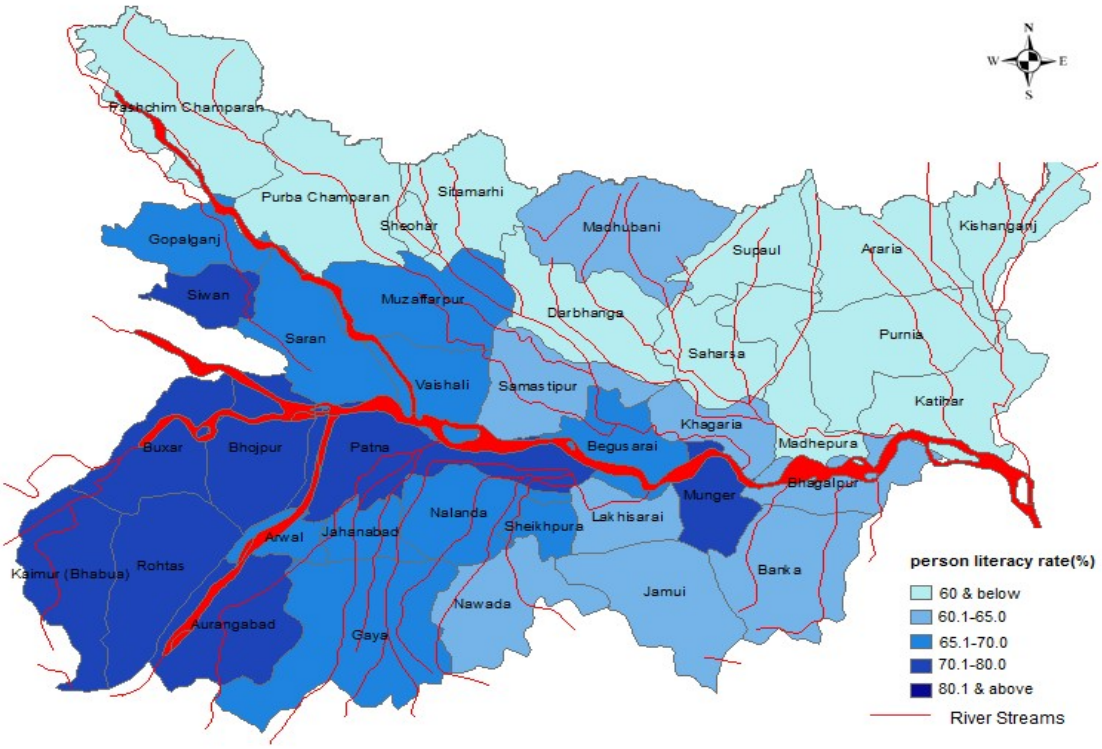


Figure 38: Literacy (Person) Rate (%) across Districts of Bihar, 2011

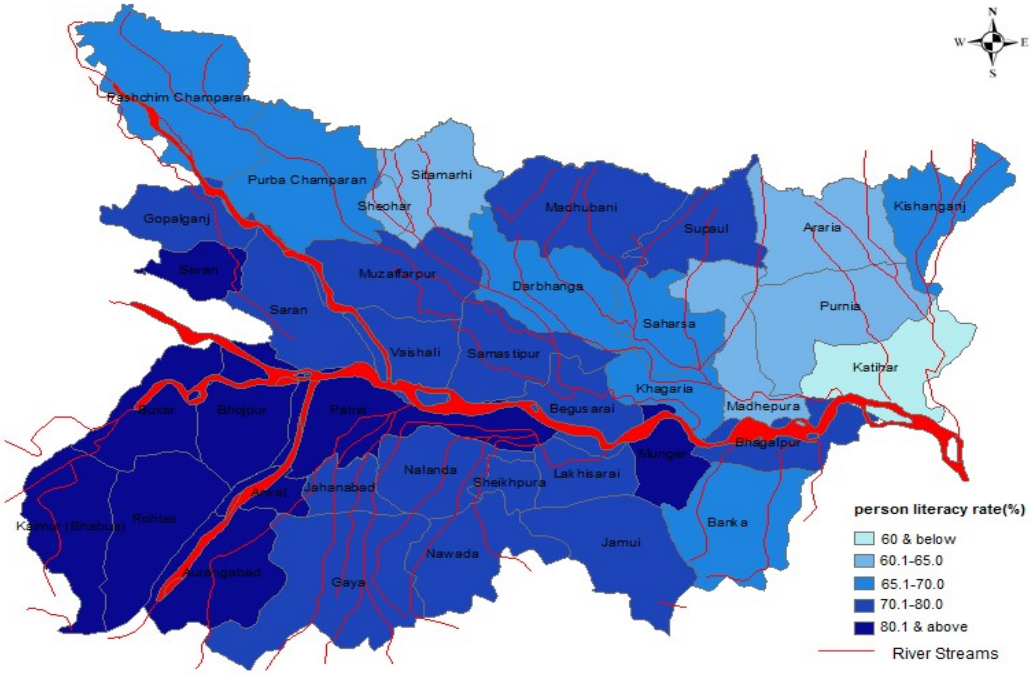


Figure 9: Literacy (Male) Rate (%) across Districts of Bihar, 2011

Male literacy almost follows the same pattern as the previous map for the combined population. Literacy rates among male population are found to be quite significant – above

60% for majority of districts. In some districts e.g., Rhotas, Bhojpur, Buxar, Siwan, Aurangabad, etc. this is as high as 80 percent. However there are lagging districts in the north and the eastern part of the state. However, as shown in Figure 40, female literacy rates across the state are not significant.

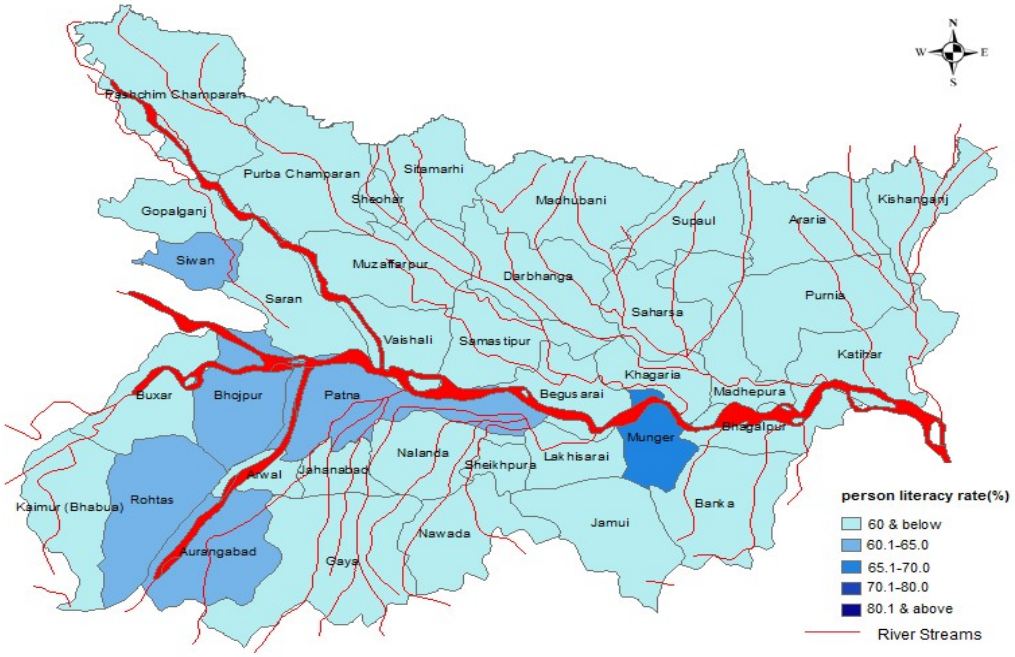


Figure 40: Literacy (Female) Rate (%) across Districts of Bihar, 2011

5.2. Education

In the backdrop of the low literacy rates, as shown in Figure 41, it is interesting to note that over the year enrolment in primary education for both boys and girls has increased. However, given the growth in population and high population density, the accumulated deficits, it is recognized that massive efforts need to be made to improve education scenario across the state Bihar. It's a fact that prosperity would not come without education.

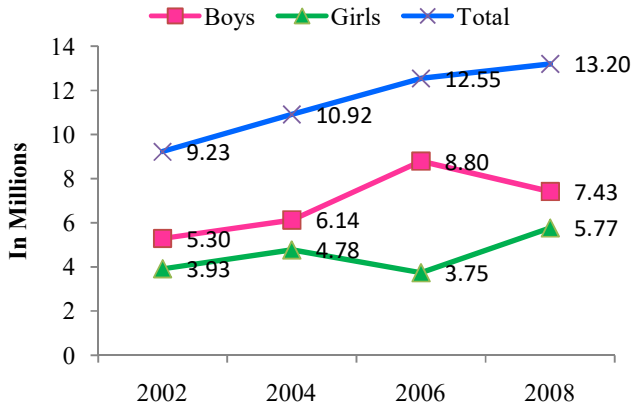


Figure 41: Enrolment in Primary Schools in Bihar, 2002-2008

Figure 42 shows upper primary enrolment in the state for 2002-2008. While there has been a rising trend until 2006, it is intriguing to note steep fall in the subsequent years. Reasons for this decline are not available.

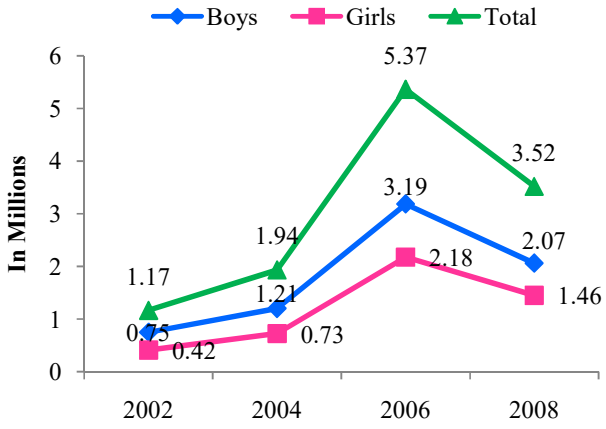


Figure 42: Upper Primary School Enrolment

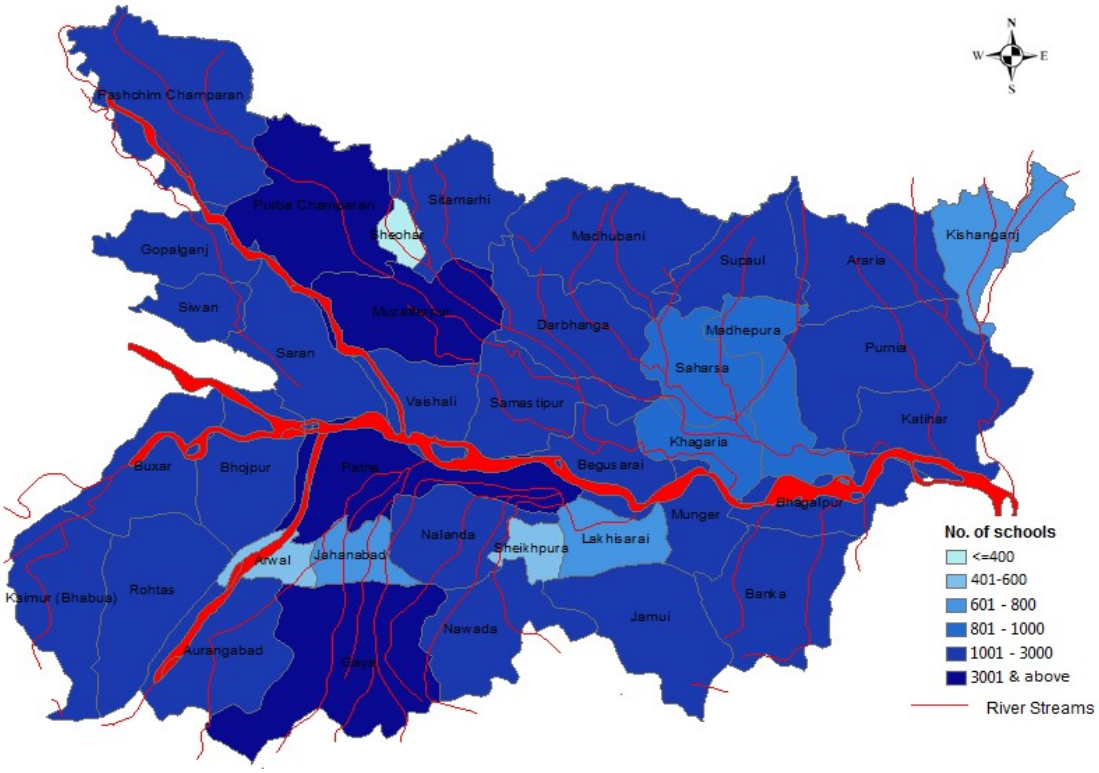


Figure 43: No. of Schools across Districts of Bihar, 2009-10

The levels of education and literacy very much depend on the education infrastructure and facilities available for the population in the state. Figures 43 and 44 present district-wise

number of schools and the 'student to teacher' ratio for 2009-10. While Figure 43 shows a rather high school coverage, however Figure 44 presents a scattered scenarios as regards 'student to teacher' ratio. The ration is found to vary from below 50 to around 100, with majority of districts falling in the 50-70 range. It is evident that the quality of education is an major issue which needs to be addressed on priority.

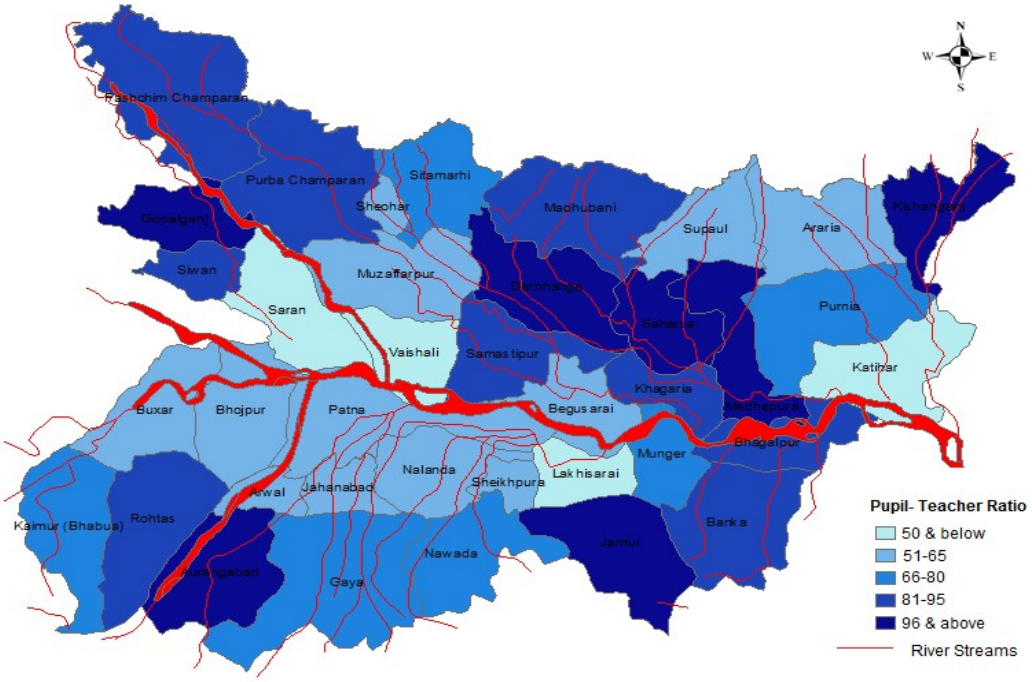


Figure 44: Student-teacher ratio across Districts of Bihar, 2009-10

5.3. Drinking Water and Sanitation

Pure drinking water facilities and the adequate management of the sanitation facilities are two prominent indicators of a healthy state. District Level Household Survey (DLHS) for Bihar conducted during 2007-08 provides comprehensive information on the household infrastructure and facilities. Figure 45 presents the proportion (%) of households availing drinking water facility (comprising piped into dwelling, piped to yard/plot, public tap/stand pipe/hand pump, tube well/ bore well/well covered/spring tanker, cart with small tank, and bottled water) across districts of Bihar. However it is to be noted that in a major part of the state, due to copious availability of groundwater, it is the shallow hand pump which is the dominant source, notwithstanding concerns on bacteriological quality of water. Thus from water availability point of view a large part of the state – particularly in the north is categorised to have high coverage. However, there are issues with water availability in south Bihar and district like Jamui have reported coverage as low as 36%.

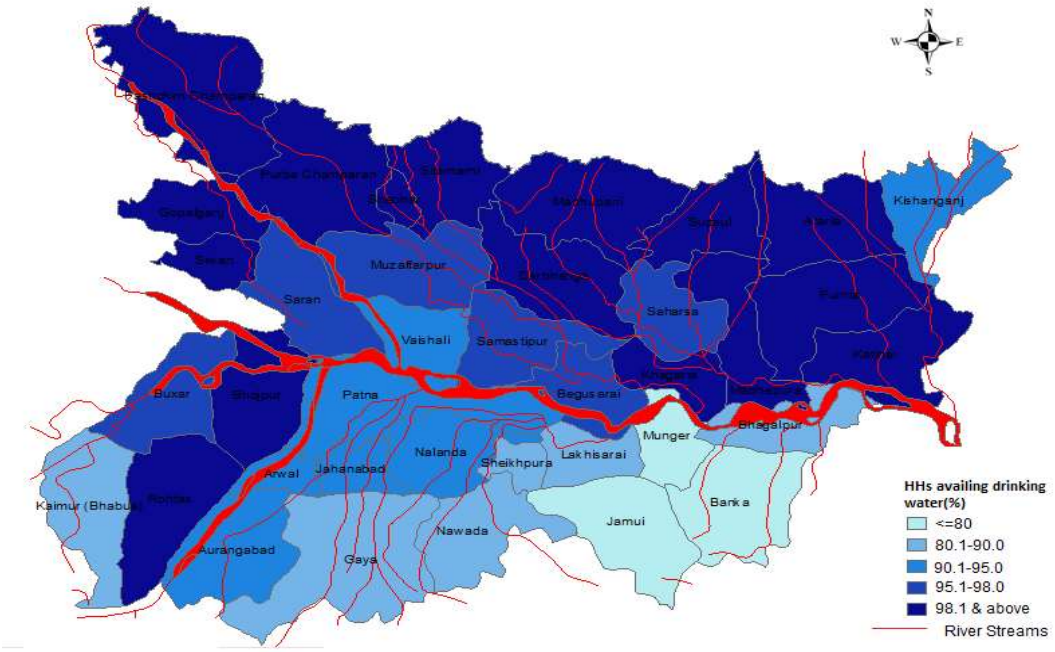


Figure 45: Households availing Drinking Water (%) across Districts of Bihar, 2007-08

Figure 46 shows proportion of households having access to toilet facility across districts of Bihar during 2007-08. Evidently the coverage is very low and this is a major issue which has potential to adversely affect environment and public health both in the urban and rural areas.

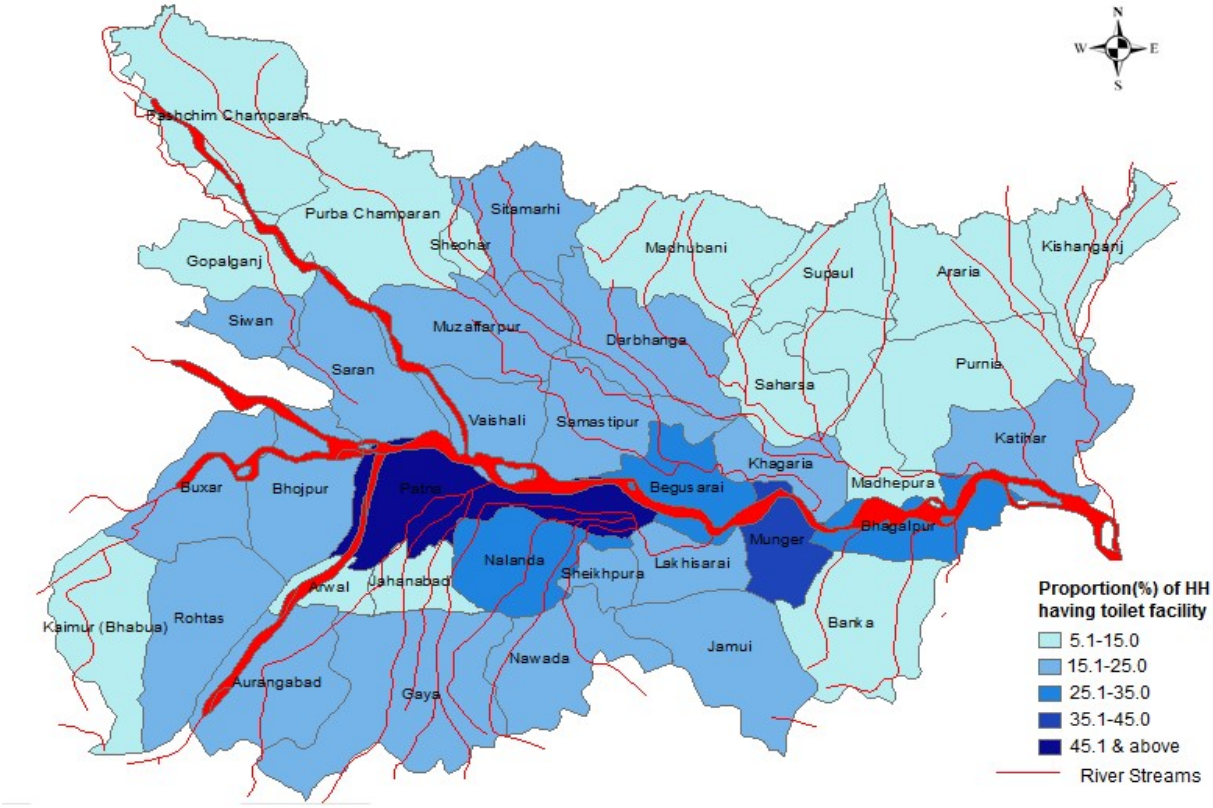


Figure 46: Households having Toilet Facility (%) across Districts of Bihar, 2007-08

5.4. Health Indicators

The health status of its population reflects the socio-economic development of a state. Health status is shaped by a variety of factors — level of income and standard of living, housing, sanitation, water supply, education, employment, health consciousness and personal hygiene and the coverage, availability, accessibility, acceptability and affordability of health services. The poor health status of the citizens of a state is a product of inadequate nutrition, lack of protected water supply and overcrowded and insanitary housing conditions. These conditions are conducive to spread of diseases related to water and air contamination, nutritional deficiency, fecal related and waterborne diseases, which typically dominate morbidity and mortality pattern in under developed regions.

Infant Mortality Rate (IMR)

IMR, considered to be one of the most sensitive indicators of health and development is defined as number of infant (under age one) deaths per thousand live births in a given year. The Table 5 presents latest available IMR data for Bihar.

Table5: Health and Mortality Indicators, Bihar, 2010-11

Particulars	Total	Rural	Urban
Infant Mortality Rate			
Total	55	56	44
Male	53	54	43
Female	56	58	46
Neo-natal Mortality Rate	35	36	27
Post Neo-natal Mortality Rate	19	19	17
Under-5 Mortality Rate			
Total	77	80	57
Male	74	76	53
Female	81	83	60

Source: Annual Health Survey, 2011, Bihar

Notes: 1.Infant mortality rate is calculated as annual deaths of infants (D) between birth and one year, divided by the annual number of births (B), all multiplied by 1000.

2.Neo-natal deaths: Infant dying before age of 29 days.

3.Post Neo-natal deaths: Infant dying during age of 29 days to < 1 year.

4.The under-five mortality is the probability that a child born in a specific year or time period will die before reaching the age of five, subject to current age specific mortality rates. It is expressed as a rate per 1,000 live births.

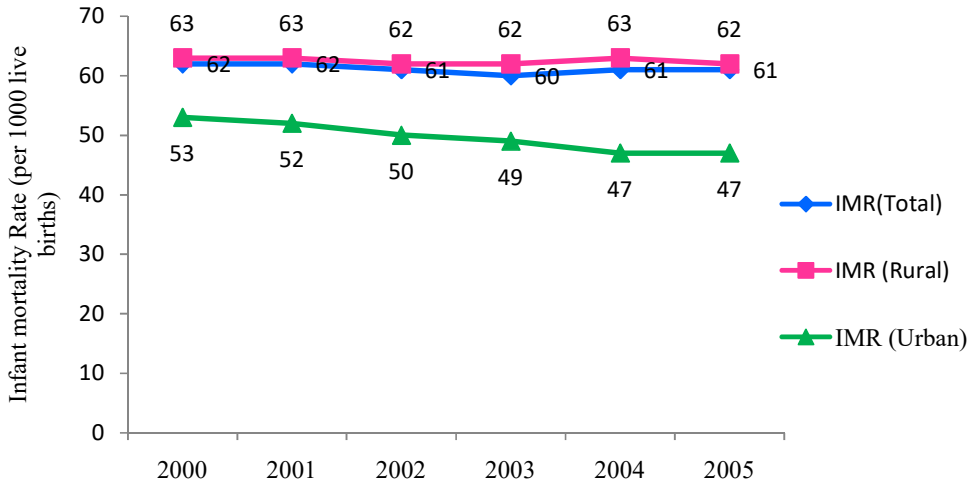


Figure 47: Infant Mortality Rate (per 1000 live births), Bihar, 2000-2005

It is seen that IMR in the state fluctuated over the years with a fall after 2001 and with a slight increase after 2003. Urban IMR was lower compared to rural IMR. This could be due to poor health facilities and lack of proper infrastructure development in rural areas of the state.

6. Conclusion and Policy Implications

Following conclusions emerge from the preceding discussion:

- The population of Bihar has increased substantially from 2001 to 2011 (@25.1%) in both the regions. This signifies that there are more people to be taken care of from, among others, the available water and other natural resources in the bank districts and hence more pressure on river Ganga.

- It is interesting to note that there is sustained declining trend in birth rates, leading to almost stable natural growth rate of population in the recent years.

- An overwhelming 90% of the state population resides in rural areas, giving the entire state the character of a 'rural state' and the general development deficit.

- Bihar is characterized as the most densely inhabited state with population density of 1102 persons/ sq.km. Density is reported to be higher in bank districts compared to the non-bank districts.

- Average statewide sex ratio at 916 in 2011 is below the national average which is 940. During the last decade there has been a drop in the sex ratio.

- Since 2004-05 the state has recorded high to very high growth in GSDP which is above the national growth rate.

- Bank districts in general have recorded higher growth in district domestic product compared to the non-bank districts. Likewise maximum increase in average per capita GDDP was recorded in bank districts.

- The maximum contribution in GSDP was made by the tertiary sector. This was followed by the primary sector. Contribution from secondary sector is around 16% which indicates poor manufacturing activity and availability of supporting infrastructure.

- The bank districts had the maximum share in tertiary sector; the non-bank districts had the maximum share in primary sector.

- Farm sector provides the maximum number of employment opportunities in both rural and urban Bihar. In non-farm sector, trade and education provide large employment.

- For bank districts proportion of rural population below poverty line was higher compared to urban areas. In non-bank districts the percentage of population below poverty line for both rural and urban area was higher as compared to bank districts.

- The amount of deposits in all banks in Bihar has increased but this is not translated into higher credits/ loans. This indicates business environment is still not conducive.

- Male and female literacy rates have increased significantly but the gender gap is quite significant.

- Overall the total primary enrolment shows a rising trend however, enrolment post 2006 have registered an inexplicable sharp decline.

- State IMR is way above the national average. Likewise state rural IMR is significantly higher than that for the urban areas. Although health infrastructure in the state has improved however there is still considerable deficit to be addressed.

As the focus of this report is on the implications of the rise in population, economic growth and social changes on the Ganga basin in the state of Bihar, the discussion on the policy implications should focus on the efficient use of resources to ensure their sustainability and economic development. However it is evident that the state has not taken advantage of its share of the available resources and is characterized by significant development deficit in all respects. Given the low social indicators, high population densities, poor infrastructure and industrial base, the state needs to imbibe policies for sustained rapid growth. It is not surprising that the current establishment is therefore seeking 'special area' status from the central government so as to be able to leverage larger share of plan funds.

While the state is endowed with copious water resources, there are issues with quality and sustainability. At the same time there are major issues with the aggregate sanitation deficit both in the rural and urban areas. Bihar as recorded significant increase in the 'census towns' i.e., small villages which have taken urban character and which are emerging as concentrated sources of sewage and solid waste. Therefore the deficit in sanitation infrastructure particular is posing major threat to the surface and groundwater resources in the state and undermining efforts in restoring water quality or River Ganga. It is therefore imperative that the state receives adequate resources and technical assistance to undertakes concerted and sustained programme for urban infrastructure.

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Appendix

Table 9: District-wise Total Population of Bihar

Districts	Years	
	2001	2011
Patna	4718592	5772804
Vaishali	2718421	3495249
Saran	3248701	3943098
Begusarai	2349366	2954367
Buxar	1402396	1707643
Munger	1137797	1359054
Bhagalpur	2423172	3032226
Khagaria	1280354	1657599
Katihar	2392638	3068149
Lakhisarai	802225	1000717
Bhojpur	2243144	2720155
Samastipur	3394793	4254782
Average for Bank Districts	**2342633.25**	**2913820.25**
Nalanda	2370528	2872523
Rohtas	2450748	2962593
Aurangabad	2013055	2511243
Jehanabad	1514315	1124176
Gaya	3473428	4379383
Nawada	1809696	2216653
Siwan	2714349	3318176
Gopalganj	2152638	2558037
Pashchim champaran	3043466	3922780
Purba champaran	3939773	5082868
Sitamarhi	2682720	3419622
Muzaffarpur	3746714	4778610
Darbhanga	3295789	3921971
Madhubani	3575281	4476044
Saharsa	1508182	1897102
Madhepura	1526646	1994618
Araria	2158608	2806200
Kishanganj	1296348	1690948
Sheohar	515961	656916
Supaul	1732578	2228397
Banka	1608773	2029339
Kaimur	1289074	1626900
Jamui	1398796	1756078
Arwal		699563
Purnia	2543942	3273127
Sheikhpura	525502	634927
Average for Non- Bank Districts	**2195476.4**	**2647645.9**

Source: Census of India 2001, 2011

Table 10: District-wise Distribution of Percentage Decadal Variation in Total Population (1991-2011)

District	Years	
	1991-01	2001-11
Patna	30.17	22.34
Vaishali	26.39	28.58
Saran	26.37	21.37
Begusarai	29.11	25.75
Buxar	29.03	21.77
Munger	20.34	19.45
Bhagalpur	27.24	25.13
Khagaria	29.32	29.46
Katihar	30.91	28.23
Lakhisarai	23.94	24.74
Bhojpur	24.58	21.27
Samastipur	25.63	25.33
Average for Bank Districts	**26.92**	**24.45**
West Champaran	30.40	28.89
East Champaran	29.27	29.01
Sheohar	36.16	27.32
Madhubani	26.08	25.19
Supaul	29.95	28.62
Araria	31.84	30.00
Kishanganj	31.50	30.44
Madhepura	29.45	30.65
Saharsa	33.03	25.79
Darbhanga	30.85	19.00
Muzaffarpur	26.74	27.54
Gopalganj	26.11	18.83
Siwan	24.78	22.25
Banka	24.47	26.14
Nalanda	18.64	21.18
Kaimur	30.64	27.54
Rohtas	27.71	20.22
Jehanabad	28.64	21.34
Aurangabad	30.19	24.75
Gaya	30.03	26.08
Nawada	33.08	22.49
Jamui	32.90	25.54
Sitamarhi	32.58	27.47
Purnia	35.23	28.66
Sheikhpura	24.96	20.82
Average for Non-Bank Districts	**29.41**	**25.43**

Source: Census of India 2001, 2011

Table 11: District-wise Percentage Birth, Death and Natural Growth Rate (2010-2011)

Districts	Crude Birth Rate (CBR)	Crude Death Rate	Natural Growth Rate
Patna	21.8	5.2	16.6
Vaishali	27.3	7.6	19.7
Saran	24.5	7.7	16.7
Begusarai	26.6	6.5	20.1
Buxar	25.1	6.8	18.3
Munger	25	6.7	18.3
Bhagalpur	26.3	5.5	20.9
Khagaria	30.7	9.4	21.3
Katihar	28.8	6.5	22.3
Lakhisarai	24	6.5	17.5
Bhojpur	24.6	5.8	18.8
Samastipur	28.7	6.9	21.8
Average for Bank Districts	26.12	6.76	19.36
West Champaran	28.6	8.9	19.7
East Champaran	30.4	8.1	22.3
Sheohar	31.2	7.6	23.6
Madhubani	24.7	7.4	17.3
Supaul	28.5	6.5	22
Araria	30.9	7.8	23.1
Kishanganj	30.5	6.5	24.1
Madhepura	30.1	7.5	22.7
Saharsa	32.1	7.8	24.2
Darbhanga	26.5	8.8	17.7
Muzaffarpur	25.5	8.6	16.9
Gopalganj	25.7	6.5	19.2
Siwan	26.1	7.5	18.6
Banka	25.8	6.1	19.7
Nalanda	26.3	8	18.2
Kaimur	25	6	19
Rohtas	25.9	7	18.9
Jehanabad	24.9	6.2	18.7
Aurangabad	25.6	6.4	19.3
Gaya	24.9	7.4	17.5
Nawada	25	5.9	19
Jamui	26.4	6.7	19.7
Sitamarhi	28	9.6	18.4
Purnia	27.6	7.2	20.4
Sheikhpura	28.9	8.1	20.8
Average for Non-Bank Districts	27.40	7.36	20.04

Source: Annual Health Survey 2010-11

Table 12: District-wise Density of Population (per sq. km) in Bihar (2001-2011)

District	Years	
	2001	**2011**
Patna	1471	1803
Vaishali	1332	1717
Saran	1231	1493
Begusarai	1222	1540
Buxar	864	1003
Munger	800	958
Bhagalpur	946	1180
Khagaria	859	1115
Katihar	782	1004
Lakhisarai	652	815
Bhojpur	903	1136
Samastipur	1175	1465
Average for Bank Districts	**1020**	**1269.08**
Nalanda	1006	1220
Rohtas	636	763
Kaimur(Bhabhua)	382	488
Gaya	696	880
Jahanabad	992	1206
Arawal	925	1099
Nawada	726	889
Aurangabad	607	760
Siwan	1221	1495
Gopalganj	1052	1258
Muzaffarpur	1180	1506
E.Champaran	991	1281
W.Champaran	582	750
Sitamarhi	1214	1491
Sheohar	1161	1882
Darbhanga	1442	1721
Madhubani	1020	1279
Jamui	451	567
Banka	533	672
Saharsa	885	1125
Supaul	724	919
Madhepura	853	1116
Kishanganj	687	898
Araria	751	992
Purnea	787	1014
Shekhapura	762	922
Average for Non-Bank Districts	**856.384615**	**1084.346154**

Source: Census of India 2001, 2011

Table 13: District-wise Sex Ratio in Bihar (2001-2011)

District	Years	
	2001	2011
Patna	873	892
Vaishali	920	892
Saran	966	949
Begusarai	912	894
Buxar	899	922
Munger	872	879
Bhagalpur	876	879
Khagaria	885	883
Katihar	919	916
Lakhisarai	921	900
Bhojpur	902	900
Samastipur	928	909
Average for Bank Districts	**906.08**	**901.25**
Nalanda	914	921
Rohtas	909	914
Kaimur	902	919
Gaya	938	932
Jahanabad	927	918
Arawal	931	927
Nawada	946	936
Aurangabad	934	916
Siwan	1031	984
Gopalganj	1001	1015
Muzaffarpur	920	898
E.Champaran	897	901
W.Champaran	901	906
Sitamarhi	892	899
Sheohar	885	890
Darbhanga	914	910
Madhubani	942	925
Jamui	918	921
Banka	908	907
Saharsa	910	906
Supaul	920	925
Madhepura	915	914
Kishanganj	936	946
Araria	913	921
Purnia	915	930
Shekhapura	918	926
Average for Non-Bank Districts	**924.50**	**923.35**

Source: Census of India 2001& 2011

Table 14: District-wise Proportion of Population by Social Groups in Bihar (2009-2010)

Districts	STs	SCs	OBCs
	Valid Percent	Valid Percent	Valid Percent
Patna	2.09	6.19	6.06
Vaishali	N.A.	5.94	3.03
Saran	2.49	2.77	4.67
Begusarai	N.A.	3.06	2.73
Buxar	9.21	2.06	1.29
Munger	0.01	1.10	1.53
Bhagalpur	0.46	1.09	3.12
Khagaria	N.A.	1.48	1.24
Katihar	17.85	1.86	1.65
Lakhisarai	0.47	1.00	0.97
Bhojpur	N.A.	3.32	2.28
Samstipur	1.65	2.20	5.89
Bank Districts	**34.25**	**32.05**	**34.46**
West Champaran	0.14	1.43	4.78
East Champaran	0.53	5.15	5.17
Sheohar	N.A.	0.27	0.64
Madhubani	N.A.	2.49	5.30
Supaul	2.70	1.37	2.52
Araria	10.63	3.87	1.55
Kishangang	0.33	1.01	1.54
Madhepura	7.97	2.09	1.55
Saharsa	3.82	2.11	0.91
Darbhanga	N.A.	1.72	4.88
Muzaffarpur	N.A.	5.41	4.91
Gopalgang	12.49	3.42	2.88
Siwan	0.90	2.34	2.90
Banka	7.40	2.10	2.27
Nalanda	N.A.	3.57	3.12
Bhabhua	7.26	2.20	1.17
Rohtas	1.16	3.68	2.77
Jehanabad	N.A.	1.59	0.79
Aurangabad	2.24	2.29	1.57
Gaya	1.74	5.78	3.79
Nawada	0.62	2.39	1.44
Jamui	5.12	1.50	1.69
Sitamarhi	N.A.	6.35	3.69
Purnea	0.69	2.42	2.87
Shekhpura	N.A.	0.13	0.52
Arwal	N.A.	1.26	0.34
Non- Bank Districts	**65.75**	**67.95**	**65.54**

Source: NSS 66th round, 2009-10

Table 15: District-wise Proportion of Population by Religious Groups in Bihar (2009-2010)

Districts	Hindus (Valid Percent)	Muslims (Valid Percent)
Patna	6.43	3.87
Vaishali	3.58	1.67
Saran	4.48	2.54
Begusarai	2.63	2.60
Buxar	1.93	0.18
Munger	1.53	0.15
Bhagalpur	2.75	4.39
Khagaria	1.49	0.77
Katihar	1.16	8.02
Lakhisarai	1.12	N.A.
Bhojpur	3.07	1.53
Samstipur	3.91	5.39
Bank Districts	**34.08**	**31.10**
West Champaran	4.15	5.04
East Champaran	5.20	3.47
Sheohar	0.39	1.21
Madhubani	3.93	4.48
Supaul	1.78	4.19
Araria	2.10	6.87
Kishangang	0.56	6.20
Madhepura	1.79	0.34
Saharsa	1.49	0.50
Darbhanga	3.68	4.69
Muzaffarpur	4.95	2.32
Gopalgang	2.45	8.31
Siwan	2.98	2.55
Banka	2.29	0.50
Nalanda	3.32	0.42
Bhabhua	1.89	0.05
Rohtas	2.79	1.97
Jehanabad	1.46	0.32
Aurangabad	2.55	0.51
Gaya	4.61	2.37
Nawada	1.94	1.01
Jamui	2.03	1.80
Sitamarhi	4.29	1.81
Purnea	1.98	7.63
Shekhpura	0.54	0.04
Arwal	0.77	0.30
Non- Bank Districts	**65.92**	**68.90**

Source: NSS 66th round, 2009-10

Table 16: Gross State Domestic Product (Rs. '000 Crores), Bihar, 2004-2011 at constant prices (2004-05)

Year	GSDP
2004–05	77781.2
2005–06	78494
2006–07	92427
2007–08	99492
2008–09	113994
2009–10 (P)	125875
2010–11 (Q)	144472
2011–12 (Adv.)	163439

Source: Economic Survey of Bihar, 2012

Table 17: GDDP (Rs. Lakh) across Districts of Bihar, 2006-2008 at 2004-05 prices

Districts	2006-07	2007-08
Patna	22659.3	26560.4
Vaishali	2391	2390.5
Saran	2463.7	2765.4
Begusarai	3068.6	3502.6
Buxar	1221.7	1373.6
Munger	1648.8	1974.3
Bhagalpur	3095.8	3393.7
Khagaria	1217.9	1343
Katihar	2184.8	2343.6
Lakhisarai	770.5	838.3
Bhojpur	2055.8	2235.1
Samastipur	3050.1	2879.1
Bank Districts	**3819**	**4299.967**
West Champaran	3946.3	4185
East Champaran	3008.5	2795.5
Sheohar	288.8	339.8
Madhubani	2608.8	2507.8
Supaul	1260.2	1289.6
Araria	1528.8	1715.2
Kishanganj	1108	1127.2
Madhepura	1104.2	1195.2
Saharsa	1369.8	1466.2
Darbhanga	2702.3	2922.3
Muzaffarpur	2799.2	2677
Gopalganj	1736.4	1821.4
Siwan	2389.7	2243.1
Banka	1184	1252.1
Nalanda	1948.5	2142.2
Kaimur	1053.2	1166.7

Rohtas	2505.9	2692.3
Jehanabad	742.1	801.3
Aurangabad	1667.8	1803.6
Gaya	3246.1	3532.6
Nawada	1317	1443.7
Jamui	1122.3	1275.6
Sitamarhi	1906.5	1884
Purnia	2127.3	2286.2
Sheikhpura	394.3	445.5
Non-Bank Districts	**1802.64**	**1880.444**

Source: Economic Survey of Bihar, 2012

Table 18: Per Capita GSDP (Rs.) in Bihar, 2004-2008 at 2004-05 constant prices

Year	Per Capita GSDP
2004–05	8,773
2005–06	8,706
2006–07	10,087
2007–08	10,690
2008–09	12,066

Source: Statistical Handbook of Bihar, 2012

Table 19: Average Per Capita GDDP (Rs.) across Districts of Bihar, 2006-2008 at 2004-05 prices

Districts	2006-07	2007-08
Patna	43177	49765
Vaishali	8038	7925
Saran	6943	7688
Begusarai	11792	13245
Buxar	7882	8725
Munger	13612	16154
Bhagalpur	11665	12609
Khagaria	8579	9307
Katihar	8187	8631
Lakhisarai	9070	9789
Bhojpur	8433	9053
Samastipur	8274	7712
Average for Bank Districts	**12137.67**	**13383.58**
West Champaran	9618	10058
East Champaran	6894	6303
Sheohar	4903	5647
Madhubani	6681	6335
Supaul	6579	6627
Araria	6274	6903
Kishanganj	7642	7637
Madhepura	6525	6949

Saharsa	8071	8476
Darbhanga	7346	7806
Muzaffarpur	8270	7776
Gopalganj	7383	7640
Siwan	8105	7512
Banka	6792	7095
Nalanda	7792	8503
Kaimur	7324	7974
Rohtas	9297	9842
Jehanabad	7251	7707
Aurangabad	7439	7909
Gaya	8405	8995
Nawada	6469	6959
Jamui	7135	7957
Sitamarhi	6314	6122
Purnia	7363	7751
Sheikhpura	6655	7376
Average for Non-Bank Districts	**7301.08**	**7594.36**

Source: Economic Survey of Bihar, 2012

Table 20: GDDP in Primary Sector (at 2004-05 Constant Prices), Bihar 2004-05 to 2007-08 (Rs. in Lakh)

Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Bank Districts	715690	709292	839348	795129	862724	811658
Non-Bank Districts	1741500	1613112	1999121	1862043	2071765	1892793

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 21: GDDP in Secondary Sector (at 2004-05 Constant Prices), Bihar 2004-05 to2007-08 (Rs. in Lakh)

Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Bank Districts	482818	509540	591327	721099	861639	982531
Non-Bank Districts	583562	657287	766486	902400	1012913	1161849

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 22: GDDP in Tertiary Sector (at 2004-05 Constant Prices), Bihar 2004-05 to 2007-08 (Rs. in Lakh)

Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Bank Districts	2614174	2578010	2953092	3253421	3654858	4060915
Non-Bank Districts	1526666	1723966	1864077	1994590	2223842	2538284

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 23: Percentage share of Bank Districts in Total GDDP of the State by Economic Activity

Economic Activity	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Agriculture	29.17	30.82	29.60	30.02	29.46	30.28
Forestry & Logging	27.27	27.16	27.05	26.95	26.80	26.65
Fishing	32.02	32.89	33.66	34.30	34.07	32.50
Mining & quarrying	48.78	42.82	51.52	34.60	22.10	18.39
Primary	**29.13**	**30.54**	**29.57**	**29.92**	**29.40**	**30.01**
Manufacturing MFG	45.73	41.34	40.74	43.50	47.98	47.98
Electricity, Gas & W.Supply	52.55	52.67	52.62	52.55	52.56	52.58
Construction	43.27	43.49	43.67	43.79	43.84	43.99
Secondary	**45.28**	**43.67**	**43.55**	**44.42**	**45.97**	**45.82**
Trade, Hotel & Restaurants	86.46	86.54	86.72	86.71	86.76	86.30
Railways	64.50	64.50	64.50	64.50	64.50	64.50
Transport by other means	55.31	55.21	54.87	53.73	52.72	51.78
Storage	51.47	51.49	51.47	51.48	51.47	51.47
Communication	44.22	44.22	44.22	44.22	44.22	44.22
Banking & Insurance	48.34	48.34	48.34	48.34	48.34	48.34
Real, Ownership of Dwel., B.ser. & Legal	45.66	45.82	45.99	46.13	46.28	46.42
Public Adminis	47.40	47.40	47.40	47.40	47.40	47.40
Other Services	40.15	40.02	40.11	40.15	40.22	40.35
Tertiary	**61.44**	**59.93**	**61.30**	**61.99**	**62.17**	**61.54**
GDDP	**49.0181**	**48.73239**	**48.63582**	**50.05572**	**50.33074**	**51.1451**

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 24: Percentage share of Non- Bank Districts in Total GDDP of the State by Economic Activity

Economic Activity	2004-06	2006-07	2006-07	2007-08	2008-09	2009-10
	Non -bank districts	Non -bank districts	Non -bank districts	Non -bank districts	Non -bank districts	Non -bank districts
Agriculture	70.83	69.18	70.40	69.98	70.54	69.72
Forestry & Logging	72.73	72.84	72.95	73.05	73.21	73.35
Fishing	67.98	67.10	66.34	65.70	65.92	67.50
Mining & quarrying	51.22	57.18	48.49	65.39	77.90	81.61
Primary	**70.87**	**69.46**	**70.43**	**70.08**	**70.60**	**69.99**
Manufacturing MFG	48.42	58.66	51.83	56.50	52.02	52.02
Electricity, Gas & W.Supply	47.86	47.33	48.67	47.45	47.44	47.42
Construction	55.03	56.51	53.75	56.21	56.16	56.01
Secondary	**54.72**	**56.33**	**56.45**	**55.58**	**54.04**	**54.18**
Trade, Hotel & Restaurants	12.57	13.46	12.44	13.29	13.24	13.70
Railways	53.98	35.50	58.45	35.50	35.50	35.50
Transport by other means	52.56	44.80	51.82	46.27	47.28	48.22
Storage	48.53	48.55	48.55	48.52	48.56	48.53
Communication	55.78	55.78	55.78	55.78	55.78	55.78
Banking & Insurance	51.66	51.66	51.66	51.66	51.66	51.66
Real, Ownership of Dwel., B.ser. & Legal	54.34	54.18	54.01	53.87	53.72	53.58
Public Adminis	52.60	52.60	52.60	52.60	52.60	52.60
Other Services	55.01	59.98	59.89	59.85	59.78	59.65
Tertiary	**35.88**	**40.07**	**38.70**	**38.01**	**37.83**	**38.46**
GDDP	**44.28472**	**51.26758**	**51.36421**	**49.94426**	**49.66926**	**48.85489**

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 25: Percentage share of different Activities in total GDDP in Bank Districts of Bihar

Economic Activity	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Agriculture	15.82	15.67	16.62	14.33	13.93	12.01
Forestry & Logging	1.95	1.91	1.61	1.45	1.25	1.12
Fishing	0.95	1.03	0.85	0.85	0.81	0.70
Mining & quarrying	0.05	0.08	0.07	0.04	0.05	0.03
Primary	**18.77**	**18.68**	**19.15**	**16.67**	**16.04**	**13.86**
Manufacturing MFG	5.25	4.47	4.06	4.97	5.83	5.14
Electricity, Gas & W.Supply	1.58	1.65	1.50	1.48	1.43	1.49
Construction	5.83	7.30	7.93	8.67	8.76	10.15
Secondary	**12.66**	**13.42**	**13.49**	**15.12**	**16.02**	**16.78**
Trade, Hotel & Restaurants	36.93	33.87	35.67	37.26	37.47	37.46
Railways	2.45	2.73	2.71	2.73	2.45	2.42
Transport by other means	2.90	3.01	2.82	2.73	2.67	2.56
Storage	0.08	0.08	0.08	0.08	0.08	0.08
Communication	1.28	1.60	1.63	1.69	1.75	2.71

Banking & Insurance	3.28	3.74	3.87	3.97	3.78	4.35
Real, Ownership of Dwel., B.ser. & Legal	4.84	5.31	5.06	5.10	4.98	5.05
Public Adminis	6.44	6.38	5.57	5.25	5.75	5.56
Other Services	10.36	11.17	9.95	9.41	9.02	9.16
Tertiary	**68.57**	**67.90**	**67.36**	**68.21**	**67.94**	**69.36**
GDDP	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 26: Percentage share of different Activities in Total GDDP in Non-Bank Districts of Bihar

Economic Activity	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Agriculture	37.53	33.43	37.42	33.48	33.80	28.96
Forestry & Logging	5.00	4.87	4.12	3.93	3.46	3.23
Fishing	1.94	1.99	1.58	1.64	1.58	1.52
Mining & quarrying	0.05	0.10	0.06	0.08	0.19	0.13
Primary	**44.52**	**40.38**	**42.35**	**39.13**	**39.03**	**33.84**
Manufacturing MFG	5.35	6.03	4.89	6.47	6.40	5.83
Electricity, Gas & W.Supply	1.38	1.41	1.31	1.34	1.31	1.40
Construction	7.13	9.02	9.24	11.16	11.37	13.53
Secondary	**13.86**	**16.46**	**16.05**	**18.96**	**19.08**	**20.77**
Trade, Hotel & Restaurants	5.16	5.01	16.56	5.72	5.79	6.22
Railways	1.97	1.43	2.33	1.50	1.37	1.40
Transport by other means	2.65	2.32	2.52	2.35	2.42	2.49
Storage	0.08	0.07	0.07	0.08	0.07	0.08
Communication	1.55	1.91	1.95	2.14	2.24	3.58
Banking & Insurance	3.37	3.80	3.92	4.25	4.09	4.86
Real, Ownership of Dwel., B.ser. & Legal	5.54	5.97	5.62	5.97	5.86	6.10
Public Adminis	6.87	6.72	5.85	5.84	6.46	6.46
Other Services	13.95	15.91	14.06	14.06	13.58	14.18
Tertiary	**41.14**	**43.16**	**41.50**	**41.91**	**41.89**	**45.38**
GDDP	**100**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: Directorate of Economics and Statistics, Department of Planning and Development, Government of Bihar.

Table 27: Population Below Poverty Line in Districts of Bihar, 2009-10

District	Rural (% of BPL)	Urban (% of BPL)
	Poverty Line:Rs.655.6 per day	Poverty Line:Rs.775.3 per day
Patna	65.83%	20.65%
Vaishali	64.49%	52.43%
Saran	61.80%	42.43%
Begusarai	46.40%	11.32%
Buxar	50.81%	19.71%
Munger	38.91%	63.64%
Bhagalpur	72.20%	43.42%
Khagaria	10.68%	43.43%
Katihar	47.12%	41.20%
Lakhisarai	62.13%	59.52%
Bhojpur	43.49%	80.92%
Samstipur	22.89%	47.20%
Bank Districts	**48.90%**	**43.82%**
West Champaran	74.56%	55.46%
East Champaran	68.65%	34.64%
Sheohar	40.42%	68.69%
Madhubani	59.98%	48.48%
Supaul	63.11%	58.64%
Araria	35.81%	0.00%
Kishangang	57.40%	43.81%
Madhepura	67.75%	38.27%
Saharsa	43.15%	24.94%
Darbhanga	49.97%	45.35%
Muzaffarpur	67.57%	44.80%
Gopalgang	52.05%	46.21%
Siwan	54.89%	74.84%
Banka	59.62%	51.56%
Nalanda	82.16%	50.72%
Kaimur	54.65%	62.46%
Rohtas	23.12%	51.16%
Jehanabad	43.06%	18.37%
Aurangabad	39.56%	42.99%
Gaya	62.90%	33.99%
Nawada	49.74%	65.22%
Jamui	66.68%	45.05%
Sitamarhi	76.17%	62.80%
Purnea	36.83%	19.74%
Shekhpura	44.40%	46.12%
Arwal	29.39%	-
Non-Bank Districts	**53.98%**	**45.37%**

Source: NSS 66th Round, 2009-10

Table 28: CD Ratio of All Banks in Bihar

Year	Deposit (Rs. Crores)	Credit (Rs. Crores)	Credit Deposit (CD Ratio)
2001-02	30,482	6,946	22.79
2002-03	33,815	8,089	23.92
2003-04	35,824	9,604	26.81
2004-05	40,295	12,031	29.86
2005-06	46,314	14,808	32.1
2006-07	56,342	19,048	33.81
2007-08	68,244	22,077	32.35
2008-09	83,048	24,051	28.96
2009-10	98,588	31,679	32.13
2010-11 (Till June 2010)	99,636	32,109	32.23

Source: State level Bankers Committee (as mentioned in Economic Survey Report 2006-11, GOB)

Table 29: Bank Group-wise and Area-wise CD Ratio in Bihar up to 31st June 2011

Bank Groups	Area	Deposits/	Investmen	CD Ratio
Commercial Bank	Rural	17,385.	6,317	36.33
	Semi-	22,858.	6,611	28.92
	Urban-	45,557.	11,898.	26.12
	Total	**85,800.**	**24,826.**	**28.93**
RRBs	Rural	8,701.	3,671.	42.19
	Semi-	2,390.	738.	30.86
	Urban-	1,221.	352.	28.85
	Total	**12,312.**	**4,760.**	**38.66**
Cooperative Bank	Rural	NA	NA	NA
	Semi-	NA	NA	NA
	Urban-	1,525.	632.	41.42
	Total	**1,525.**	**632.**	**41.42**
All Banks	Rural	26,086.	9,987.	38.29
	Semi-	25,248.	7,348.	29.1
	Urban-	48,302.	12,882.	26.67
	Total	**99,636.**	**30,217.**	**30.33**

Source: Economic Survey Report 2010-11, GOB

Table 30: District-Wise CD ratio of Commercial Banks

District	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Patna	29.64	32.18	27.64	25.11	24.18	26.53	28.07
Vaishali	29.7	31.9	32.17	28.45	30.72	29.9	29.33
Nalanda	26.99	27.44	25.77	24.59	27.13	29.75	29.41
Bhojpur	23.61	24.95	24.51	20.74	24.5	23.9	23.12
Buxar	28.39	31.08	30.99	24.17	31.48	31.56	29.49
Rohtas	35.24	39.79	40.5	36.24	36.02	38.37	39.93
Kaimur	44.65	46.06	43.04	47.13	48.16	52.16	49.54
Gaya	25.89	28.37	28.46	28.67	31.45	32.07	31.84
Jehanabad	21.71	23.62	25.28	23.78	28.84	29.98	31.08
Arawal	23.51	26.66	26.8	26.35	32.06	45.38	32.26
Nawada	24.38	27.16	26.06	22.91	31.66	34.44	37.11
Aurangabad	28.31	26.65	23.76	23.22	27.95	31.82	32.7
Saran	23.73	26.18	23.12	23.85	26.25	24.35	23.12
Siwan	20.1	22.07	20.68	18.78	20.08	21.63	21.18
Gopalganj	27.45	29.12	30.19	25.68	25.65	28.66	28.97
West Champaran	56.85	51.69	48.99	47.31	47.12	45.69	48.77
East Champaran	40.63	43.68	42.34	36.87	38.94	44.07	44.7
Muzaffarpur	33.84	36.21	34.29	43.33	45.34	35.69	36.99
Sitamarhi	40.39	40.24	35.16	32.23	32.91	34	35.83
Sheohar	28.05	30.06	29.44	38.29	42.31	34.09	39.4
Darbhanga	28.82	29.31	26.45	22.99	26.4	28.54	25.47
Madhubani	33.25	32.68	30.32	25.55	28.32	29.4	28.95
Samastipur	37.65	38.5	36.05	37.09	39.69	44.36	43.96
Begusarai	43.72	44.95	40.32	35.59	37.83	39.63	43.06
Munger	21.34	23.35	23.17	23.28	21.02	29.64	26.66
Sheikhpura	27.04	27.61	26.72	24.94	29.77	28.6	27.9
Lakhisarai	25.88	24.4	24.23	22.83	24.26	24.95	22.98
Jamui	28.63	29.18	28.3	25.61	25.85	26.79	27.81
Khagaria	38.57	38.34	32.7	32.37	36.55	36.05	37.5
Bhagalpur	32.98	37.77	35.79	30.98	30.09	28.97	26.14
Banka	39.97	44.62	40.55	33.86	35.83	35.15	33.29
Saharsa	37.1	33.9	36.31	29.03	37.52	34.53	33.87
Supaul	34.84	32.38	35.66	28.16	31.99	36.1	37.21
Madhepura	44.59	42.63	42.29	26.43	28.06	43.39	30.79
Purnea	41.62	51.33	51.53	45.09	49.79	53.12	50.01
Kishanganj	51.66	53.17	52.77	49.1	49.85	53.34	53.15
Araria	54.26	51.69	50.72	38.03	38.57	45.84	48.95
Katihar	59.85	58.19	55.59	43.98	45.59	44.92	43.01

Source: Economic Survey 2012-13

Table 31: Distribution of Commercial Bank Branches in Bihar and their Growth Rate

Year	Total Branches	Growth Rate	Rural share (%)	Semi-urban (%)	Urban (%)
2001	3620	1.49	69.3	18.5	12.2
2002	3616	-0.11	69.1	18.5	12.4
2003	3609	-0.19	69.1	18.6	12.3
2004	3618	0.25	68.7	18.9	12.4
2005	3648	0.77	64.8	20.07	15.13
2006	3675	0.74	63.59	20.6	15.81
2007	3712	1.01	62.8	20.66	16.54
2008	3792	2.16	61.63	20.97	17.41
2009	3942	3.96	59.72	21.66	18.62
2010	4156	5.43	57.72	22.45	19.83

Source: Economic Survey of Bihar 2006-07 and 2010-11, GOB

Table 32: Micro Finance in Bihar

Year	No. of SHGs with Bank Linkage	Amount of Credit (Rs Lakhs)
Upto 2004	16,246	5,200
2004-05	11,769	3,700
2005-06	18,206	3,100
2006-07	26,417	8,300
2007-08	49,738	24,100
2008-09	25,696	21,100
2009-10	30,241	29,500
2010-11	7,287	5,300
Total	**1,85,600.**	**1,003**

Source: State Level Bankers Committee (as mentioned in the Economic Survey Report 2010-11, GOB)

Table 33: District-wise Average Literacy Rate

District	Years	
	2001	**2011**
Patna	63.82	72.47
Vaishali	51.63	68.56
Saran	52.01	68.57
Begusarai	48.55	66.23
Buxar	57.49	71.77
Munger	60.11	73.3
Bhagalpur	50.28	64.96
Khagaria	41.56	60.87
Katihar	35.29	53.56
Lakhisarai	48.21	64.95
Samastipur	45.76	63.81
Bhojpur	59.71	72.79
Average for Bank Districts	**51.20**	**66.82**
Pashchim champaran	39.63	58.06
Purba champaran	38.14	58.26

Sheohar	37.01	56
Sitamarhi	39.38	53.53
Madhubani	42.35	60.9
Supaul	37.8	59.65
Araria	34.94	55.1
Kishnganj	31.02	57.04
Madhepura	36.19	53.78
Saharse	39.28	54.57
Darbhanga	44.32	58.26
Muzaffarpur	48.15	65.68
Gopalganj	48.19	67.04
Siwan	52.01	71.59
Banka	43.4	60.12
Nalanda	53.64	66.41
Kimur	55.57	71.01
Rhotas	62.36	75.59
Aurangabad	56.03	72.77
Gaya	57.5	66.35
Nawada	51.07	61.63
Jamui	47.36	62.16
Jehanabad	42.74	68.27
Arwal	N.A.	69.54
Purnia	35.51	52.49
Sheikhpura	49.01	65.96
Average For Non – Bank Districts	**44.9**	**62.38**

Source: Census Data 2001-2011

Table 34: District-wise Male Literacy Rate

District	**Years**	
	2001	**2011**
Patna	73.81	80.28
Vaishali	64	77
Saran	67.81	79.71
Begusarai	59.71	74.36
Buxar	72.82	82.78
Munger	70.68	80.06
Bhagalpur	60.11	72.3
Khagaria	52.02	68.51
Katihar	45.51	60.99
Lakhisarai	60.97	73.98
Samastipur	57.83	73.09
Bhojpur	74.78	84.08
Average For Bank Districts	**63.34**	**75.60**
Pashchim champaran	51.91	68.16
Purba champaran	50.14	68.02
Sheohar	45.54	63.72

Sitamarhi	51.02	62.56
Madhubani	57.26	72.53
Supaul	53.23	71.65
Araria	46.5	64.15
Kishnganj	42.8	65.56
Madhepura	48.87	63.82
Saharse	52.04	65.22
Darbhanga	57.18	68.58
Muzaffarpur	60.19	73.61
Gopalganj	63.81	78.38
Siwan	67.67	82.77
Banka	56.28	69.76
Nalanda	66.94	77.11
Kimur	70.57	81.49
Rhotas	76.54	85.29
Aurangabad	70.9	82.52
Gaya	71.99	76.02
Nawada	63.81	71.4
Jamui	61.22	73.77
Jehanabad	57.1	79.3
Arwal	N.A.	81.27
Purnia	46.16	61.09
Sheikhpura	62.56	76.14
Average For Non-Bank Districts	**58.09**	**72.46**

Source: Census Data 2001- 2011

Table 35: District-wise Female Literacy Rate

District	**Years**	
	2001	**2011**
Patna	52.17	63.72
Vaishali	38.14	59.1
Saran	35.74	56.89
Begusarai	36.21	57.1
Buxar	40.36	59.84
Munger	47.97	65.53
Bhagalpur	38.83	56.49
Khagaria	29.62	52.16
Katihar	24.03	45.37
Lakhisarai	34.26	54.89
Samastipur	32.69	53.52
Bhojpur	42.81	60.2
Average For Bank Districts	**37.74**	**57.07**
Pashchim Champaran	25.85	46.79
Purba Champaran	24.65	47.36
Sheohar	27.43	47.25

Sitamarhi	26.35	43.4
Madhubani	26.56	48.3
Supaul	21.02	46.63
Araria	22.14	45.18
Kishnganj	18.49	47.98
Madhepura	22.31	42.75
Saharse	25.31	42.73
Darbhanga	30.35	46.88
Muzaffarpur	35.2	56.82
Gopalganj	32.81	56.03
Siwan	37.26	60.35
Banka	29.1	49.4
Nalanda	39.03	54.76
Kimur	38.9	59.56
Rhotas	46.62	64.95
Aurangabad	40.08	62.05
Gaya	42.04	55.9
Nawada	37.4	51.09
Jamui	32.64	49.44
Jehanabad	26.92	56.24
Arwal	N.A.	56.85
Purnia	23.72	43.19
Sheikhpura	34.13	54.93
Average For Non-Bank Districts	**30.65**	**51.42**

Source: Census Data 2001-2011

Table 36: Infant Mortality Rate in Bihar and All Over India (2000-2005)

Year	Bihar (Infant Mortality Rate)			India (Infant Mortality Rate)		
	Total	Rural	Urban	Total	Rural	Urban
2000	62	63	53	68	74	44
2001	62	63	52	66	72	42
2002	61	62	50	63	69	40
2003	60	62	49	60	66	38
2004	61	63	47	58	64	40
2005	61	62	47	58	64	40

Source: Population Foundation of India, 2007

Demographic & Socio-Economic Analysis

In Lower Ganga Basin- II (West Bengal)

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology

IIT Bombay	IIT Delhi	IIT Guwahati	IIT Kanpur	IIT Kharagpur	IIT Madras	IIT Roorkee

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Frame Work for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who have contributed directly and those who have taken lead in preparing this report is given on the reverse side.

Dr Vinod Tare
Professor and Coordinator
Development of GRBMP
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1. Introduction

Since time immemorial, population growth has its direct effect on environmental degradation via overexploitation of water and natural resources. Population growth and water usage are interdependent with each other. Population growth leads to shortage in accessibility of usable water and at the same time shortage of water leads to migration of population and other socio-economic consequences. Hence, for effective and sustainable management of the Ganga river Basin, one needs to understand the growth and composition of population, sectoral composition of workforce, change in land and water use patterns, livelihood pattern and their possible impact on the river water resources. Management of the Ganga basin is required to be viewed as a part of the broader environmental management and in relation to socio-economic demands, acknowledging the political and cultural context.

Keeping the above aspects in view, the present study examines the demographic and socio-economic features in the Lower Ganga Basin (West Bengal) and assesses implications and options for the GRMEMP. Figures and facts documented and analyzed in the report are based on secondary data collected from various sources viz. Statistical Diary and Statistical Abstracts published by the Government of West Bengal, Population Census, and NSSO reports and various other important sources.

2. Lower Ganga Basin: The State of West Bengal

West Bengal is located between latitudes 21°38'-27°10'N and longitudes 85°50'-89°50'E covering a geographical area of 88,752 sq.km. West Bengal is on the eastern bottleneck of India stretching from Himalayas crossing the Ganges up to the Bay of Bengal. The state has three international boundaries with Nepal, Bhutan and Bangladesh. Its capital is located at Kolkata (erstwhile Indian capital and currently the third largest urban agglomeration) on the banks of the Ganges which is known as River Hubli in that reach. There are 8 major landforms prevalent in West Bengal: (a) Darjeeling Himalayan Hill region; (b) Terai region; (c) North Bengal Plains; (d) Rarh region; (e) Coastal region; (f) Mangrove area; (g) Western plateau and high lands; and (h) Ganges delta. West Bengal stands third in the country in terms of mineral production with coal constituting the major part. More importantly, West Bengal is fed by numerous rivers and rivulets, both snow-fed and rain-fed. The state has 19 districts which are grouped under 3 divisions: Burdwan division (Burdwan, Birbhum, Purulia, Bankura, Paschim Medinipur, Purba Medinipur and Hooghly); Presidency Division (Murshidabad, Nadia, North 24 Paraganas, South 24 Paraganas, Howrah and Kolkata) and Jalpaiguri Division (Coochbehar, Jalpaiguri, Darjeeling, North Dinajpur, South Dinajpur and Maldah). Generally, the region comprising districts above the Ganga i.e. Maldah, North Dinajpur, South Dinajpur, Darjeeling, Jalpaiguri and Coochbehar is collectively termed as North Bengal. The region comprising the remaining districts is known as South Bengal.

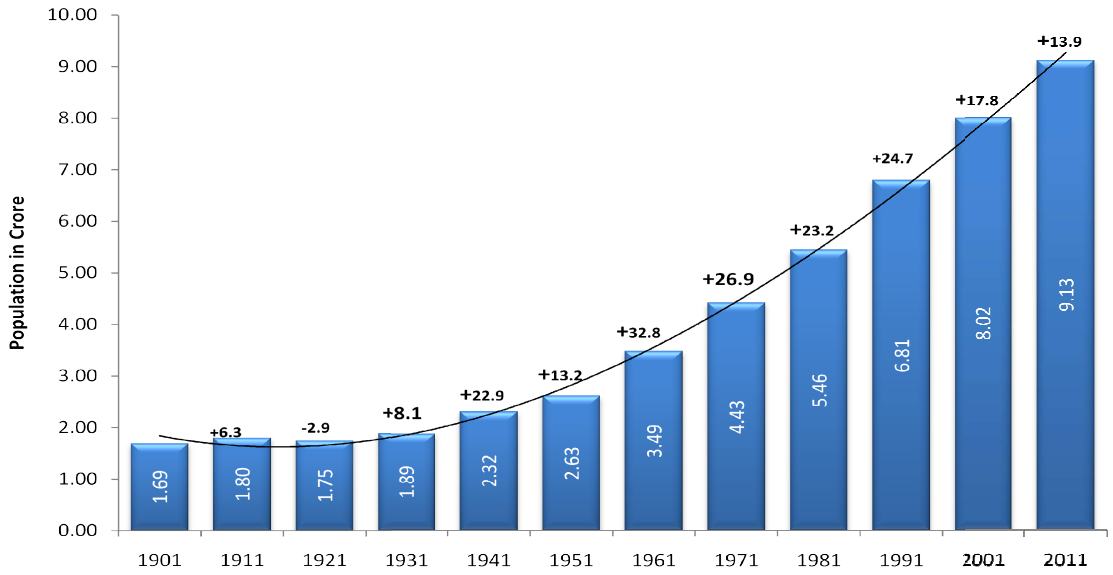
PLEASE INSET A MAP OF WEST BENGAL SHOWING DISTRICTS, THE N AND S BENGAL, THE RIVER GANG, ETC.

3. Demographic Characteristics

3.1. Trends in Population Growth

The following figure shows population figures for West Bengal from 1901 to 2011 and the corresponding rate of change . Except for the decade ending 1921 which recorded a fall and for the initial decade when the growth rate was rather low, the population of the state has been rising at a more or less steady rate. Highest deal growth rate of 33% was recorded during 1951-61 while in the subsequent decades the rate of growth has been declining and as per the latest Census 2011 it stands at around 14%. Nonetheless, West Bengal remains one of the most populous states of the country with total population of 9.13 Crore in 2011.

Figure 1: Trends in Population and Population Growth Rate (%) in West Bengal, 1901-2011

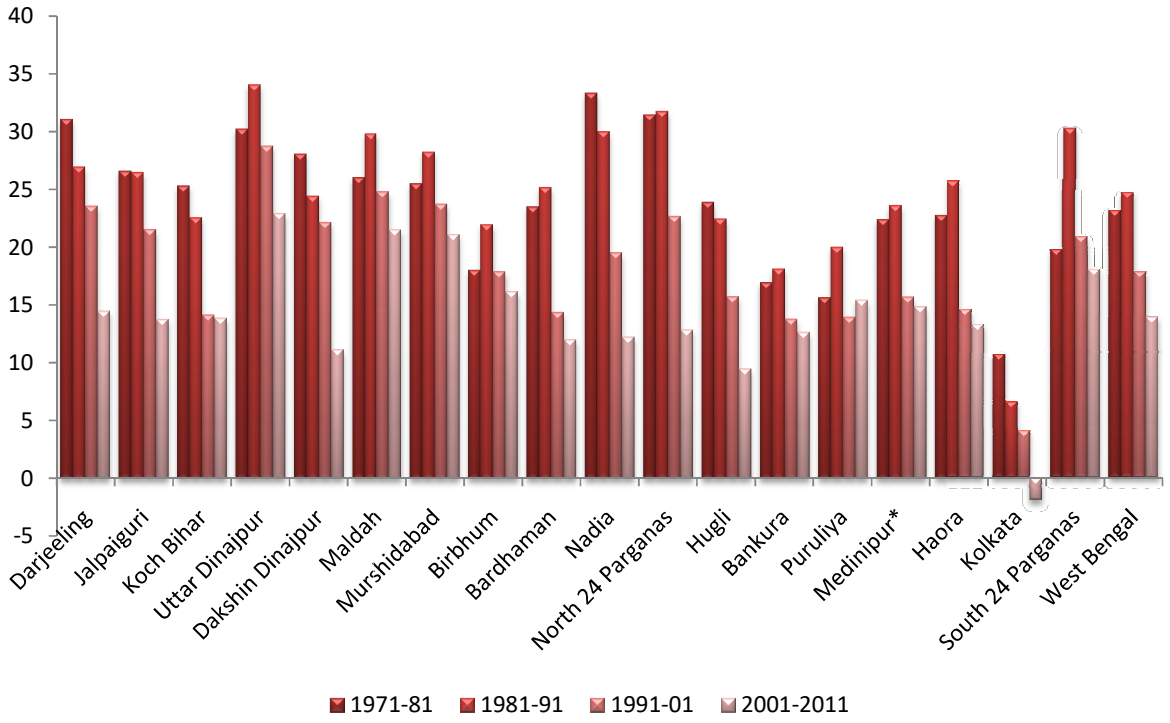


Source: Census of India, 2011

Figure 2 shows district-wise decadal population growth trends in West Bengal starting from 1971-81 to 2001-11. There has been a steady fall in decadal population growth rates in the state and also in all its districts. For the entire state, population growth rate was the highest during 1981-91 and lowest during 2001-11. However, the growth rates have varied significantly across districts. During the span of last 40 years, only Kolkata has displayed a negative growth rate (-1.88%) in the last decade, whereas Murshidabad, Maldah and Uttar Dinajpur respectively have displayed very high growth rates (21.07%, 21.5% and 22.9%

respectively). Apart from Kolkata, the districts which have displayed relatively slower growth rates in the last decade are Hooghly (9.49%), Dakshin Dinajpur (11.16%) and Howrah (13.31%).

Figure 2: Trends of Decadal Population Growth Rate (%) in West Bengal, 1971-81 to 2001-11



Source: State Forest Report 2011-12, Govt of WB

3.2. Trends in Natural Growth Rate

Birth rate is defined by the number of live births per thousand population in a particular time-frame and the "natural growth rate" is found out by subtracting the death rate from the birth rate. It is equal to the rate of population change in the absence of migration. Figure 3 shows the trends in birth rate, death rate and natural population growth rate in the state since 1983. As seen from Figure 3, by and large the death rate follows a linear pattern. It is the birth rate which has recorded sharp declining trend (about 50% decrease between 1983 and 2011) that has led to declining natural growth rate of population in the State. Since 2003, the state has witnessed sharp decline in birth rate and an almost stabilized death rate resulting in a similar trend of sharp fall in the natural growth rate. This is a positive indication of the effectiveness of family planning programme which would help in controlling population pressures on, among others, natural resources in the Ganga basin in particular.

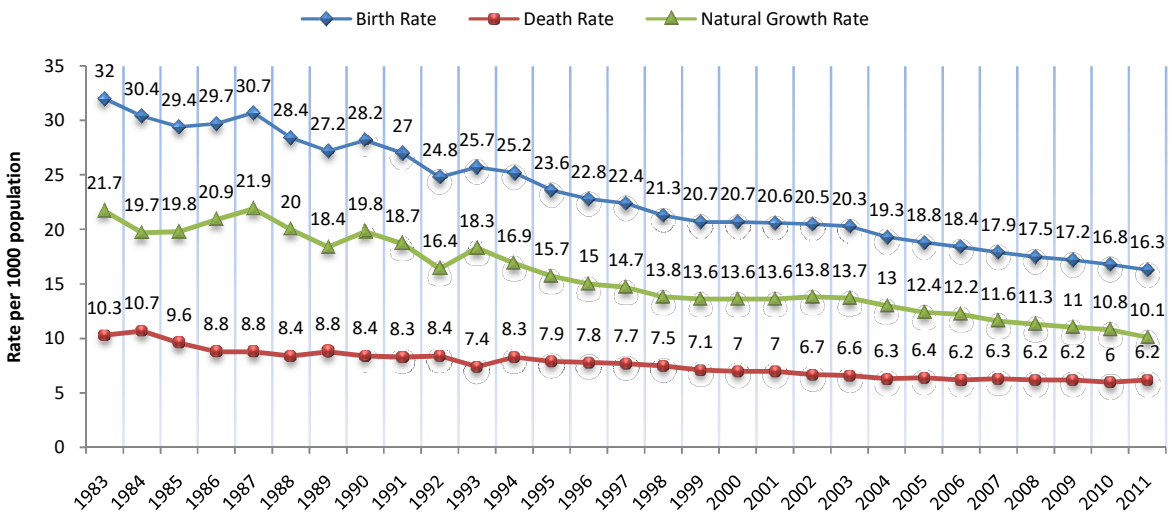


Figure 3: Birth, Death, and Natural Growth Rate (per 1000population), West Bengal, 1983-2011

Source: Office of resident Commissioner, Govt of West Bengal & Census of India, 2011 (Prov)
rcwb.in/rcwb/wp.../27.-Birth-rate-and-Death-rate-of-West-Bengal.pdf

3.3. Distribution of Population

Distribution of population indicates the proportion of the state's total population residing in rural and urban areas across the districts. West Bengal has been experiencing an increasing share of urban population over time. As per the Census 2011, about 31.89 percent of population in the state lives in urban areas. Especially the last decade has witnessed sharp increase of 3.9% in urban population in the state. (Figure 4).

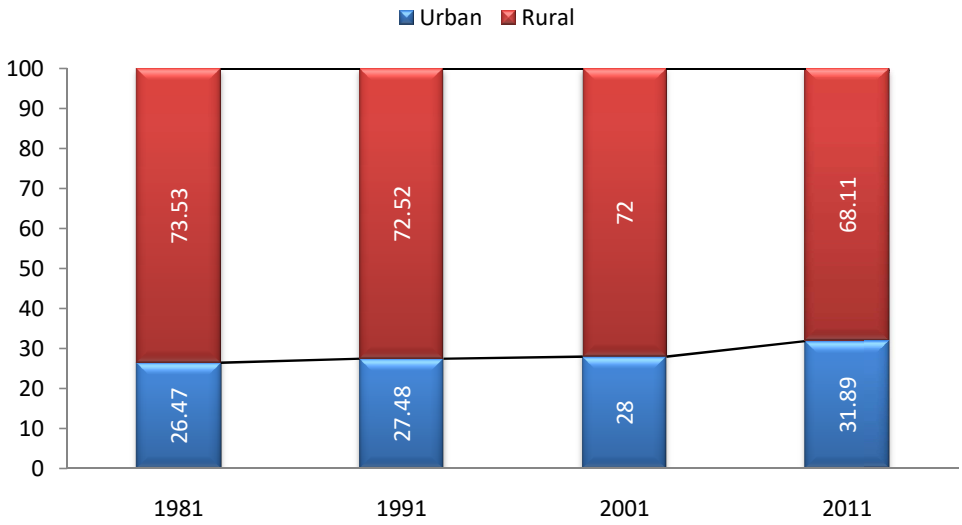


Figure 4: Distribution of population by Place of Residence, 1981-2011. West Bengal

Source: Census of India, 2011

Figure 5 present share of different districts in the total, rural and urban population in the State in 2011 (represented in the primary axis) and the extent of urbanization in the districts (represented by the secondary axis). It is noted that about 68% of the total population of the state resides in 10 river-bank districts. On the same lines, the urban population is also concentrated in the river-bank districts accounting for about 85% of the total state urban population. Further, among the 10 river-bank districts around 56 % urban population of the state is residing in the 4 districts of North 24 Paraganas (20%), Kolkata (15.40%), Burdwan (10.6%) and Howrah (10.5%). The river-bank districts also have greater share (60.32%) in rural population, as compared to the non-river bank districts.

Among all the districts Kolkata is fully urbanized. The other most urbanized districts are Howrah (63.30%), North 24 Paraganas (57.59%), Burdwan (39.87%), Darjeeling (38.99%) and Hooghly (38.62%). Among these districts, except for Darjeeling all others are categorized as river-bank districts which shows the extent of urbanisation along river(s).

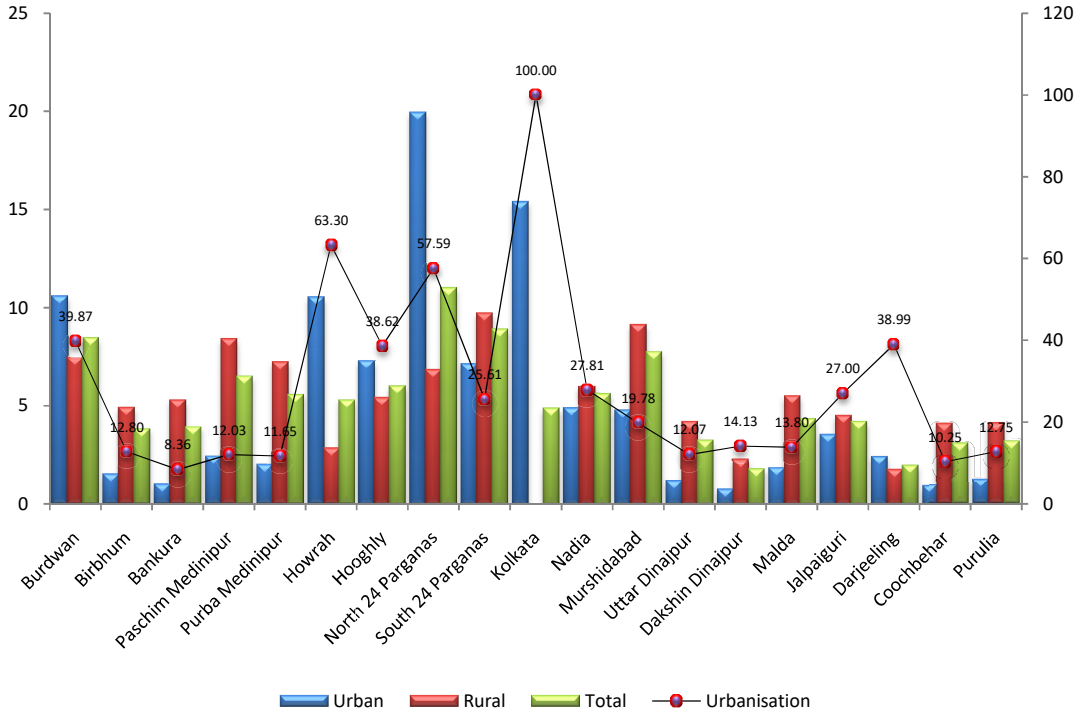


Figure 5: District-wise percentage share in the total State Population and Level of Urbanization in 2011

Source: Census of India, 2011

3.4. Population Concentration

Population concentration tells us how intensely population is concentrated in a particular geographical area and is generally represented by "density", which is defined by the

number of people residing per square km of area. Density of population suggests clustering, scattering, randomness or uniformity in the distribution of population, which further helps one assess the population pressure on particular areas or resources. Figure 6 presents the historical data since 1901 for India and West Bengal on the density of population. Interestingly, West Bengal's density of population has always remained higher than the national average with the gap widening at a faster rate over time. Although since 1951, both the national and state trends have reflected sudden rise, West Bengal has witnessed a much sharper rise leading to an increasing gap. In 2011, West Bengal reached population density of 1029 persons/sq km as against the national average of 382 persons/sq km. As per Census 2011 data, West Bengal is the second most densely populated state in the country after Bihar (1102/sq km) (Figure 6).

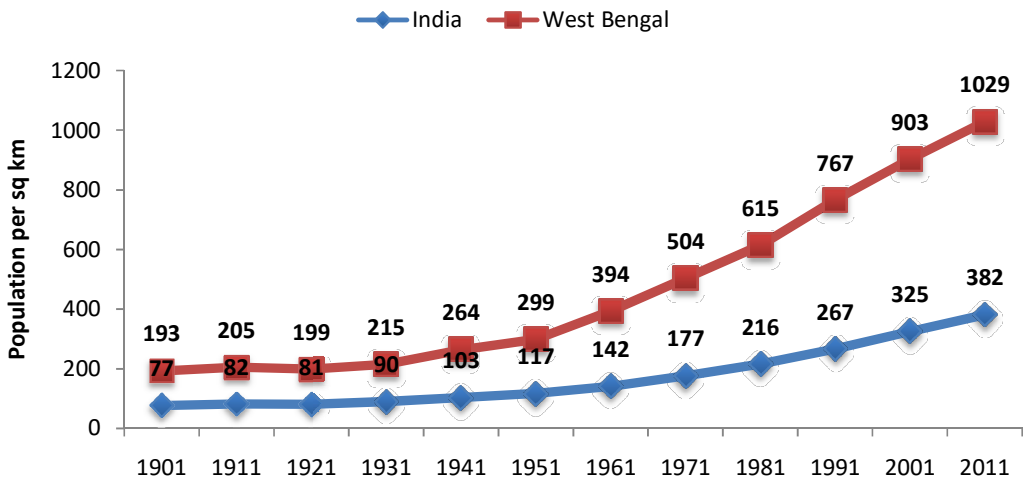


Figure 6: Population Density (Per Sq. Km) in West Bengal and India, 1901-2011

Source: Census of India, 2001 & 2011

District-wise comparison indicates that Kolkata (24252 / sq km) happens to be the most densely populated district of the state. Leaving aside Kolkata, which is an urban district, there are also quite a few other districts, which have very high population density compared to the average density of the state. According to 2011 census, very high population density is observed in Howrah (3300) followed by North 24 Paraganas (2463), Hooghly (1753). Interestingly, all these districts fall under the river-bank region. The density is found lowest in Purulia (468) followed by Bankura (523) and Darjeeling (585) (Figures 7 and 8). Clearly the river system could be experiencing significant impact in terms of both water quality and quantity in the bank districts.

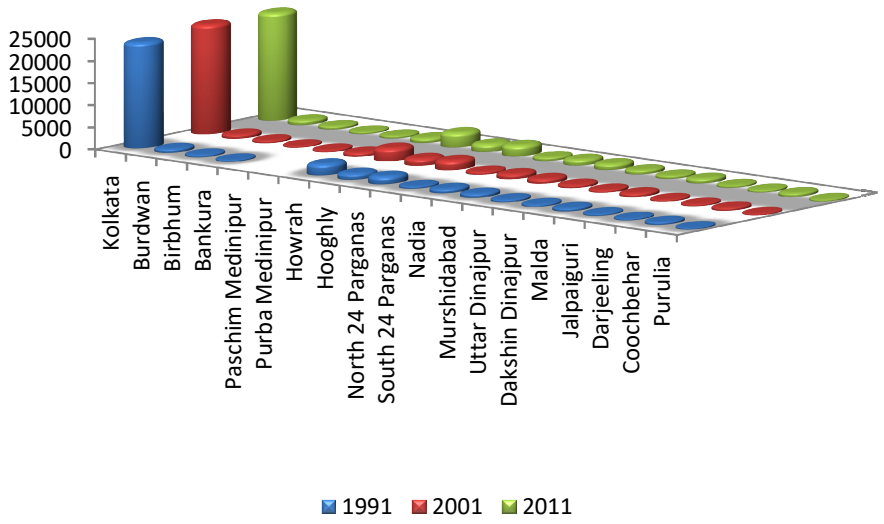


Figure 7: Population Density (Persons/sq.km.) across Districts of West Bengal, 1991-2011

Source: Census of India: 1991, 2001 & 2011

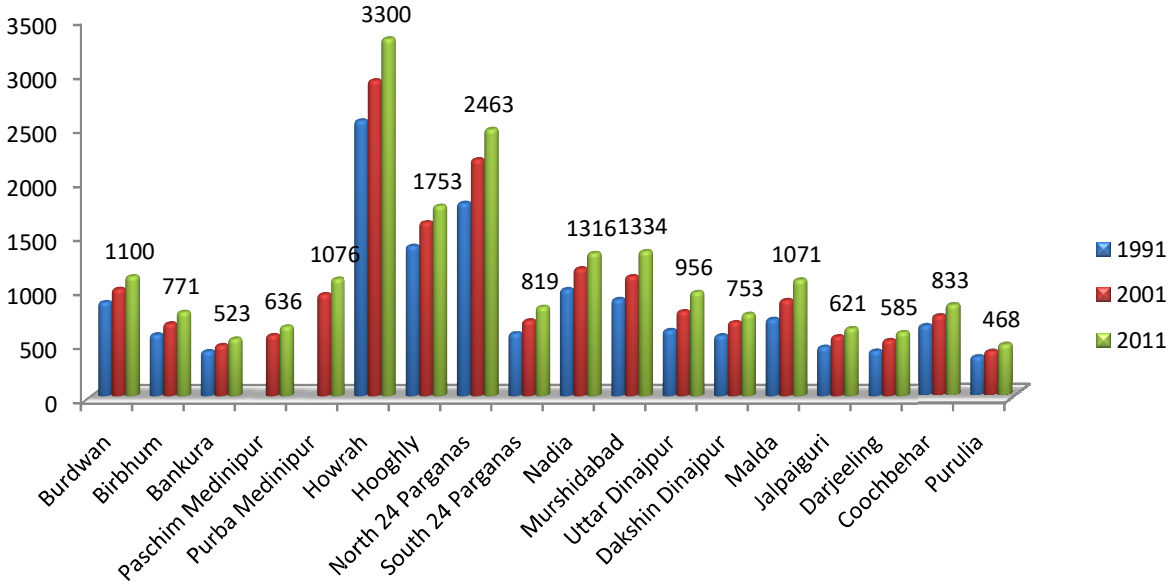


Figure 8: Population Density (Persons/sq.km.) across Districts of West Bengal (excluding Kolkata), 1991-2011

Source: Census of India: 1991, 2001 & 2011

3.5. Composition of Population

Population composition is depicted in terms of a pyramidal structure depicting proportional allocation of the population according to age groups and gender. Figure 9 presents the age-

sex pyramid of population in the state during 2009-10. It is a typical view of the structure of a developing economy with broad base and narrower top. In 2010, West Bengal reported 27.4 % male and 27.3% female below 15 years of age, 67.5% male and 68.3% female population between 15-64 years, and 5 % male and 4.6% female population above 64 years. The age group of 15-24 commands 20% males and 19.8% females.

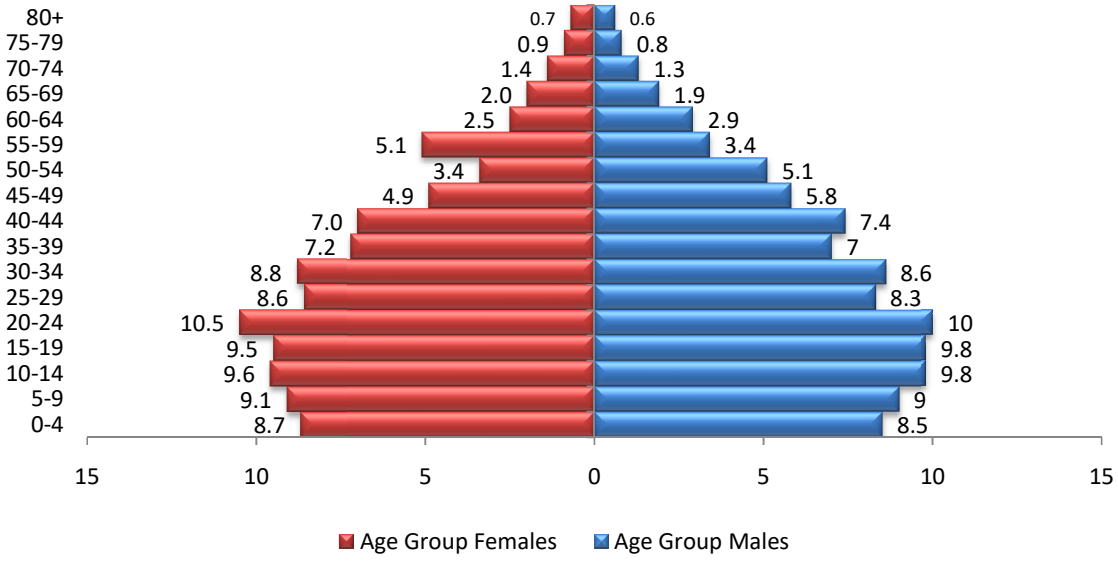


Figure 9: Age-Sex Population Pyramid, West Bengal, 2010

Source : Ministry of Home Affairs, Govt of India (via www.wbstat.com)

Sex ratio is defined as the number of females per 1000 males. Figure 10 depicts a comparative picture of the trends in sex ratio in West Bengal vis-à-vis India for the last 11 decades (1901-2011). While the national figure shows a falling trend, the trend for West Bengal follows the same trend till 1941with the ratio falling to the lowest level of 852 during 1941. Subsequently the trend reversed and the ratio reached highest level od 947 in 2011, which incidentally also surpasses the national average of 940. Among the districts, the most notable case of improvement in sex ratio is that of Kolkata which rose from 636 in 1971 to 899 in 2011. The reversal in the sex ration over the last 7 decades can be attributed to, among others, better family welfare programmes, better health care, improved awareness on family planning and last but not the least - growing prominence of women in the economy of the state.

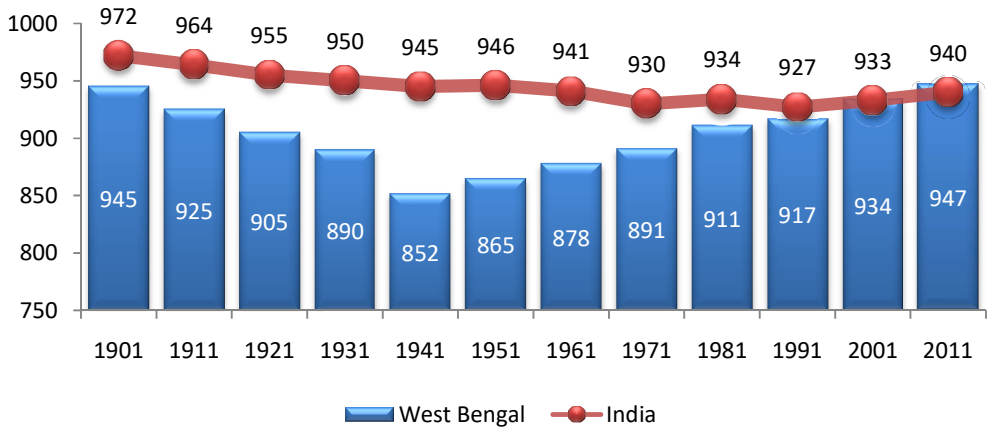
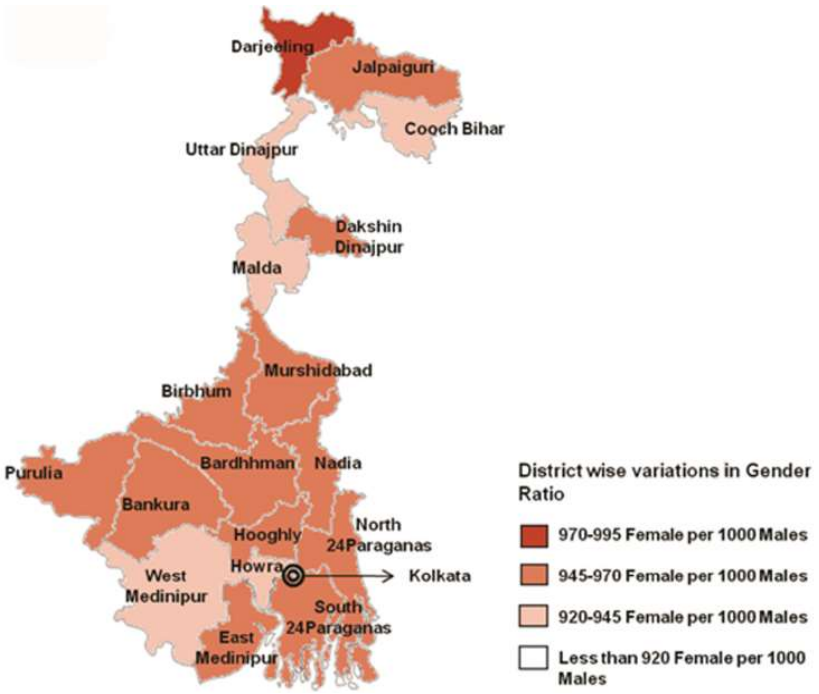


Figure 10: Trends in Sex Ratio (Female/1000 Male), West Bengal vis-à-vis India, 1901-2011

Source: Census of India , 2011



Map 1: Sex Ratio (Female/1000 Male) across Districts of West Bengal, 2011

Source:- Data : Census of India , 2011 (prov); Map : NSDC report on District wise skill gap study for the state of West Bengal

The share of SC and ST population to total population of the state is about 28%. There is, however, larger concentration of SC and ST population in districts like Coochbehar (56%), Jalpaiguri (51%), Dakshin Dinajpur (45%) and Bankura (41%). All these are non-bank districts. There is least concentration of SC and ST population in Kolkata district (6%) (Figure 12).

As regards religion, little over 72% of the population is Hindu and about 25% is Muslim (Figure 13). The districts with predominance of muslim population are Murshidabad (63.7%), Malda (49.7%), Uttar Dinajpur (47.4%), Birbhum (35.1%) and South 24 Paraganas (33.2%).

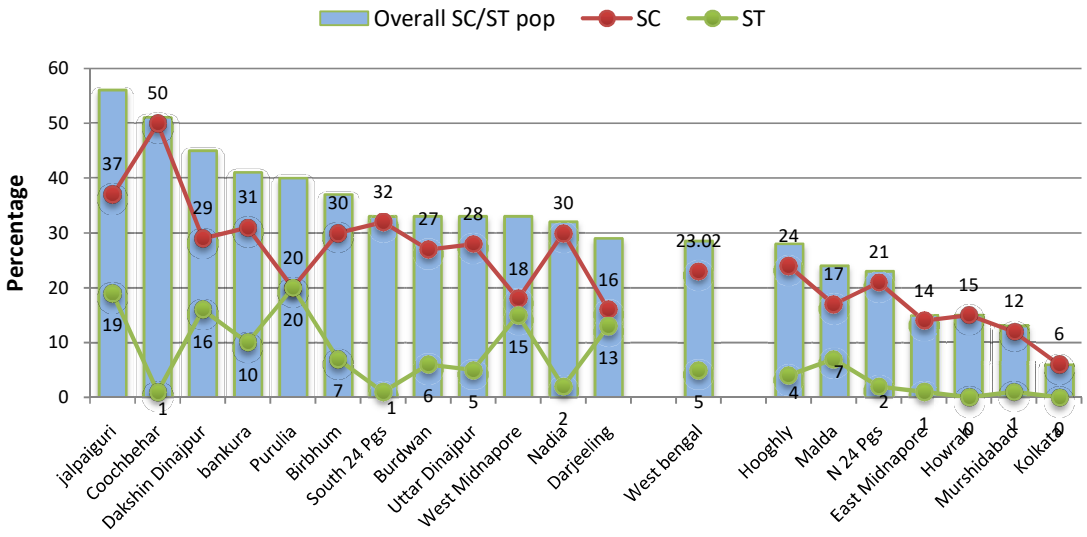


Figure 12: Proportion (%) of SC & ST Population, West Bengal, 2001

Source: www.wbfin.nic.in/writereaddata/EconomicReview11_Part2.pdf

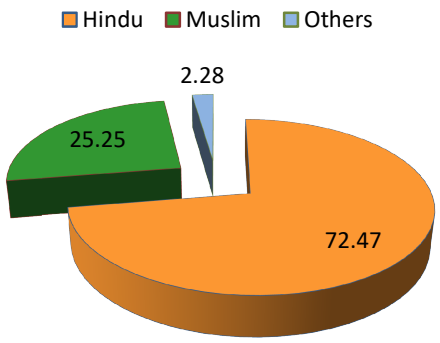
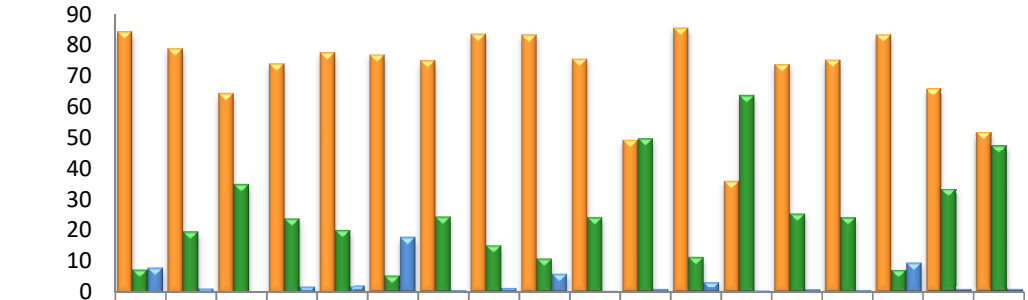


Figure 13: Proportion of population on basis of religion, West Bengal, 2001

Source: http://www.wbhealth.gov.in/Statistics%20_Html/2006_2007/4/4_4.htm



	Bankura	Burdwan	Birbhum	Dakshin Dinajpur	Kolkata	Darjeeling	Howrah	Hooghly	Jalpaiguri	Coochbehar	Maldah	Medinipur	Murshidabad	Nadia	N 24 Parganas	Purulia	S 24 Parganas	Uttar Dinajpur
Hindu	84.	78.	64.	74	77.	76.	75	83.	83.	75.	49.	85.	35.	73.	75.	83.	65.	51.
Muslim	7.5	19.	35.	24	20.	5.3	24.	15.	10.	24.	49.	11.	63.	25.	24.	7.1	33.	47.
Others	8.1	1.3	0.4	1.9	2.0	17.	0.5	1.2	5.8	0.2	1	3.0	0.4	0.8	0.5	9.4	0.9	0.9

Figure 14: Districtwise segregation of population on basis of religion in West Bengal, 2001

Source: http://www.wbhealth.gov.in/Statistics%20_Html/2006_2007/4/4_4.htm

3.6. Population Dependency

Population dependency is measured by the dependency ratio, which takes into account the population in the age group 0-14 years and 65 years and above as compared to the rest of the population. A high dependency ratio indicates that the economy needs to support a greater proportion of its population. Figure 15 illustrates the proportion of population in different age groups during 2010 for West Bengal. It is found that about 32% of the total population of the state is 'dependent'. However, it is , interesting to note that about 34.4% of the total population belongs to 20-39 year age group , which can be considered the most productive age group.

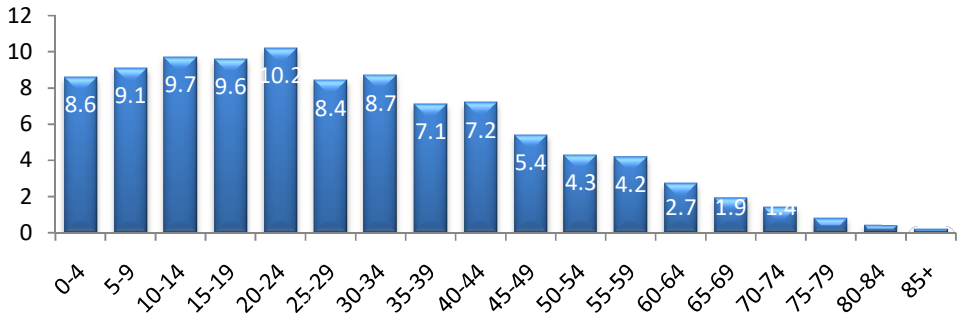


Figure 15: Proportion of population by age group, West Bengal, 2010

Source: Ministry of Home Affairs, Govt of India

4. Economic Indicators

4.1. Gross State Domestic Product (GSDP) & Per Capita Income (PCI)

In West Bengal, there has been steady rise in the GSDP over the period in recent years. Its GSDP was Rs 208,656 Crore in 2004-05, which increased to Rs 313,065 Crore in 2010-11. At the same time, the per capita income (PCI) has also maintained an increasing trend with the figure rising to Rs 31,673 in 2010-11 from Rs 22,649 in 2004-05. While all the districts have followed an increasing trend, districts like North 24 Paraganas, Burdwan and Kolkata have exhibited a steeper curve indicating higher rate of growth of gross domestic output. Again the PCI has also shown upward movement continuously with some districts exhibiting much higher rate of change.

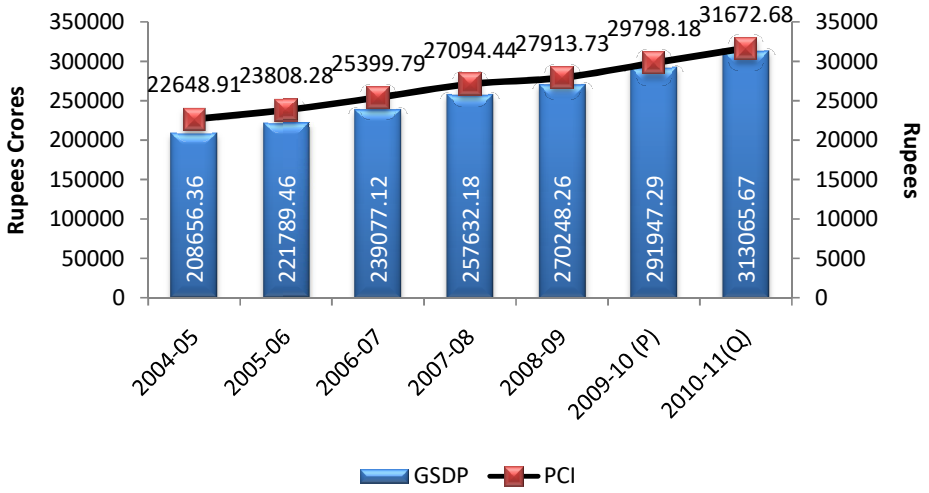


Figure 16: Trends in GSDP in West Bengal at Constant (2004-05) Prices

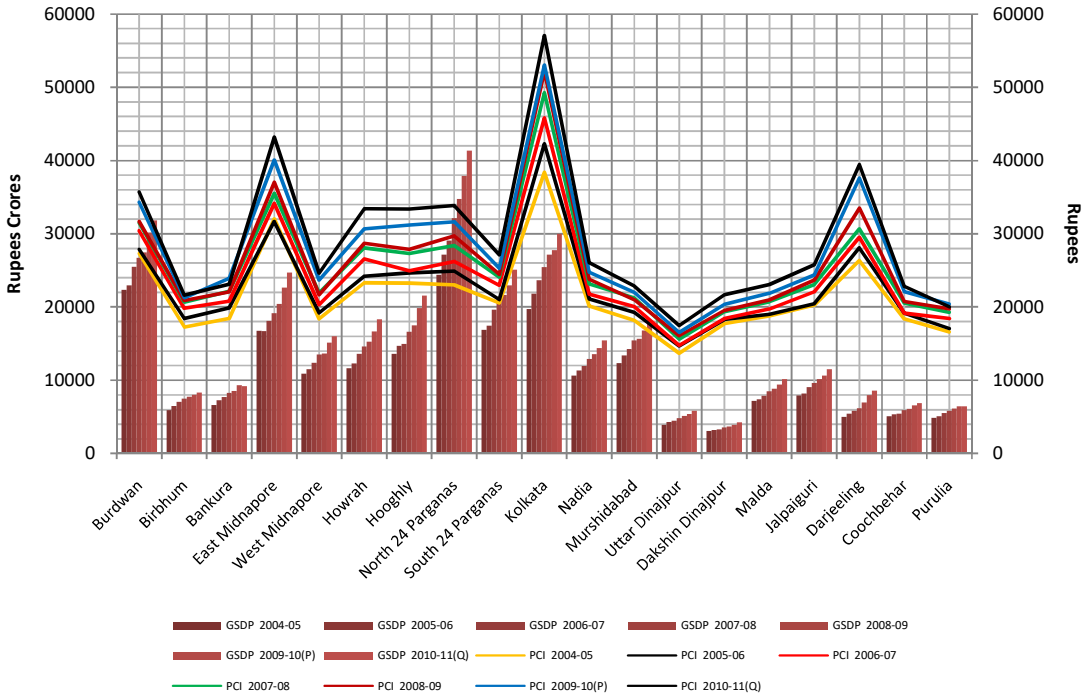


Figure 17: **Gross State Domestic Product across districts of WB, at Constant (2004-05) Prices**

Source: Bureau of Applied Economics & Statistics, Govt of WB

4.2 Trends in Sectoral Composition of GSDP

Figure 18 presents the sectoral composition of GSDP of West Bengal from 2004-05 to 2010-11 at constant (2004-05) prices. The current trend in sectoral composition in the state, by and large, resembles the trend that the country at large has been experiencing. As expected, contribution from tertiary sector to the GSDP is the highest and its share has risen from 54.41% in 2004-05 to 61.72% in 2010-11. The secondary sector remains almost stagnant with its share hovering round 19%. However, the primary sector's share has fallen from about 25% in 2004-05 to about 19% in 2010-11. This trend indicates that opportunities in agriculture are declining, while in the manufacturing there does not appear to be measurable growth and services sector is the only one offering major scope for growth.

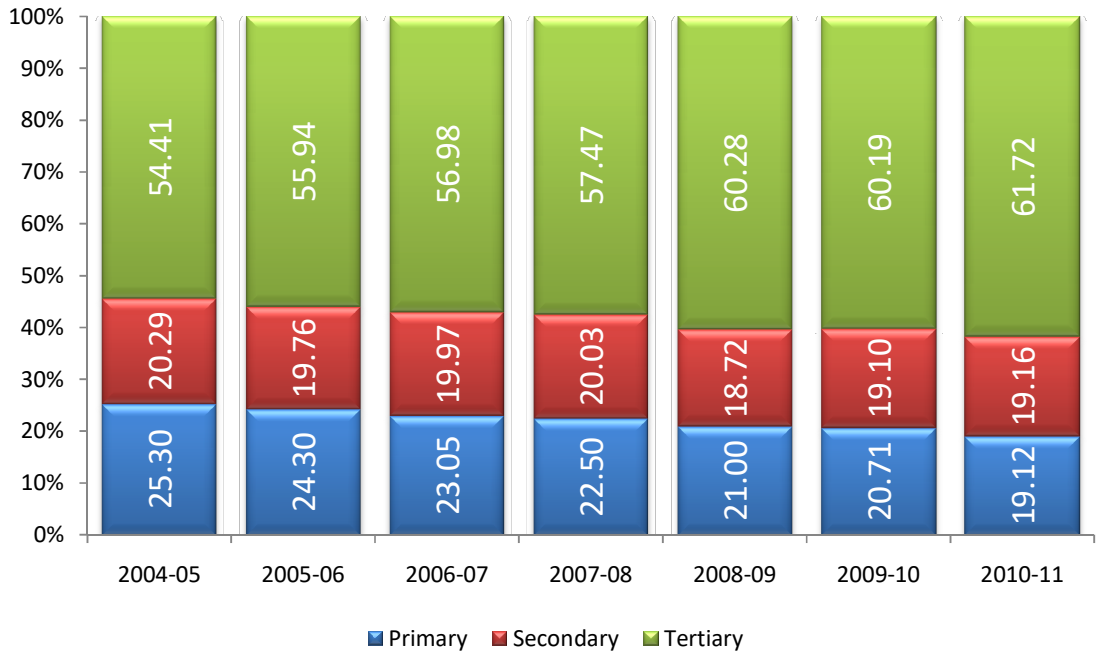


Figure 18: Sectoral Composition of GSDP (%), West Bengal, at Constant (2004-05) prices

Source: Bureau of Applied Economics & Statistics, Govt of West Bengal

In 2004-05, the share of top six river-bank districts of West Bengal to total primary sector contribution was about 49%. They were North 24 Paraganas (8.83%), Murshidabad (8.67%), Purba Medinipur (8.29%), South 24 Paraganas (7.86%), Nadia (7.67%) and Burdwan (7.53%). In 2010-11, their share remained more or less unchanged. In secondary sector, top four river-bank districts namely Purba Medinipur (9.99%), North 24 Paraganas (11.70%), Burdwan (18.41%) and South 24 Paraganas (9.31%) had a share close to 49% in 2004-05.

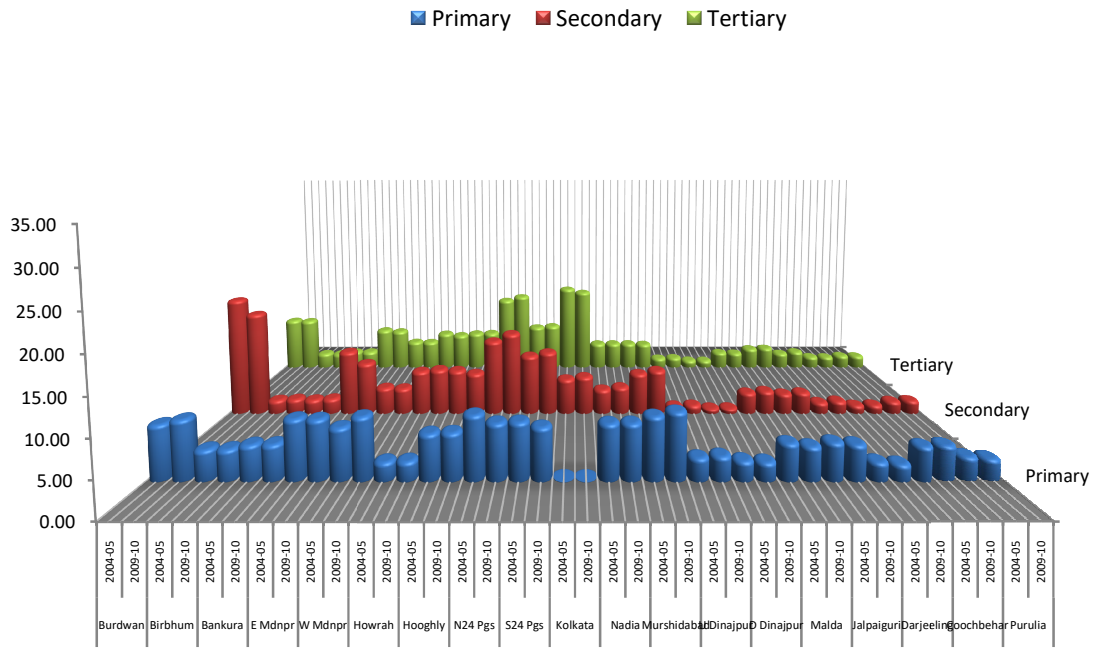


Figure 19: Sectoral Composition of GSDP (%) across Districts of West Bengal, 2004-2010

Source: Bureau of Applied Economics & Statistics, Govt of West Bengal

4.3 Trends in Occupational Structure

The occupational distribution of main workers of West Bengal is depicted in figure 20. It is found that around 39 % of the main workers constitute cultivators and agricultural labourers. The rate of female participation is significantly low both in urban and rural areas.

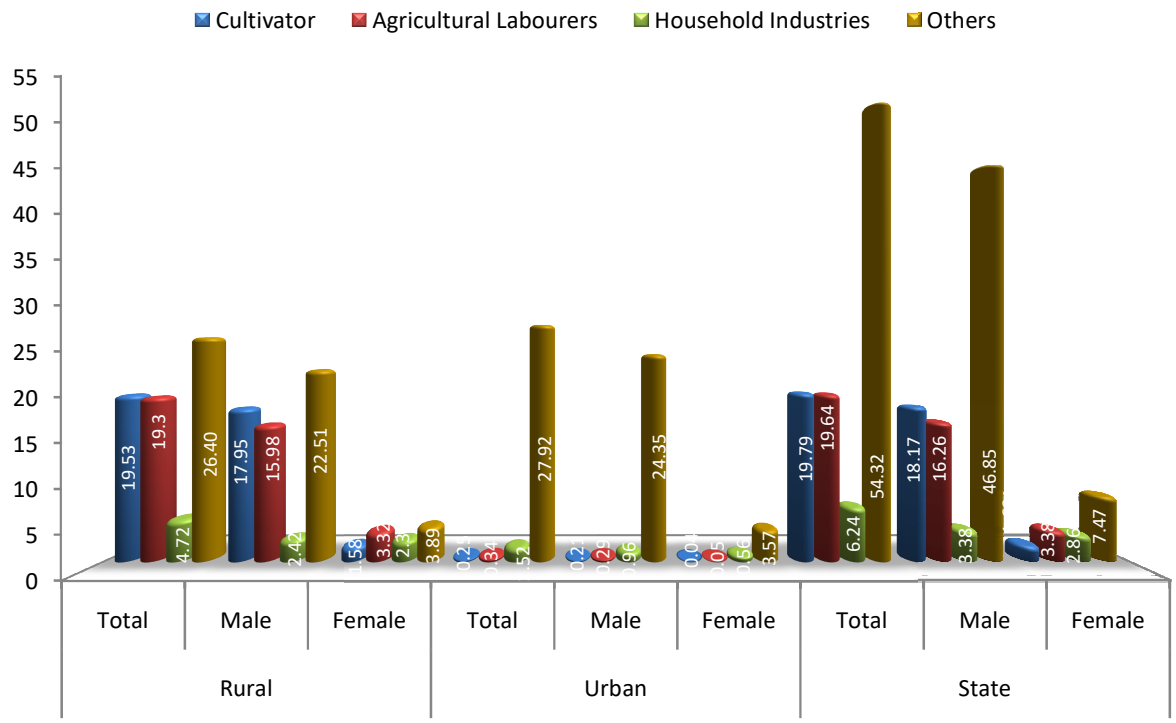


Figure 20: Proportion (%) of Main Workers by Occupational Category, West Bengal, 2001

Source: Bureau of Applied Economics & Statistics, Govt of West Bengal

Figure 21 shows the district-wise proportion of cultivators, agricultural labourers, main workers and marginal workers as in 2001. Undivided Midnapore shares the maximum proportion of agricultural labourer and cultivators followed by Burdwan.

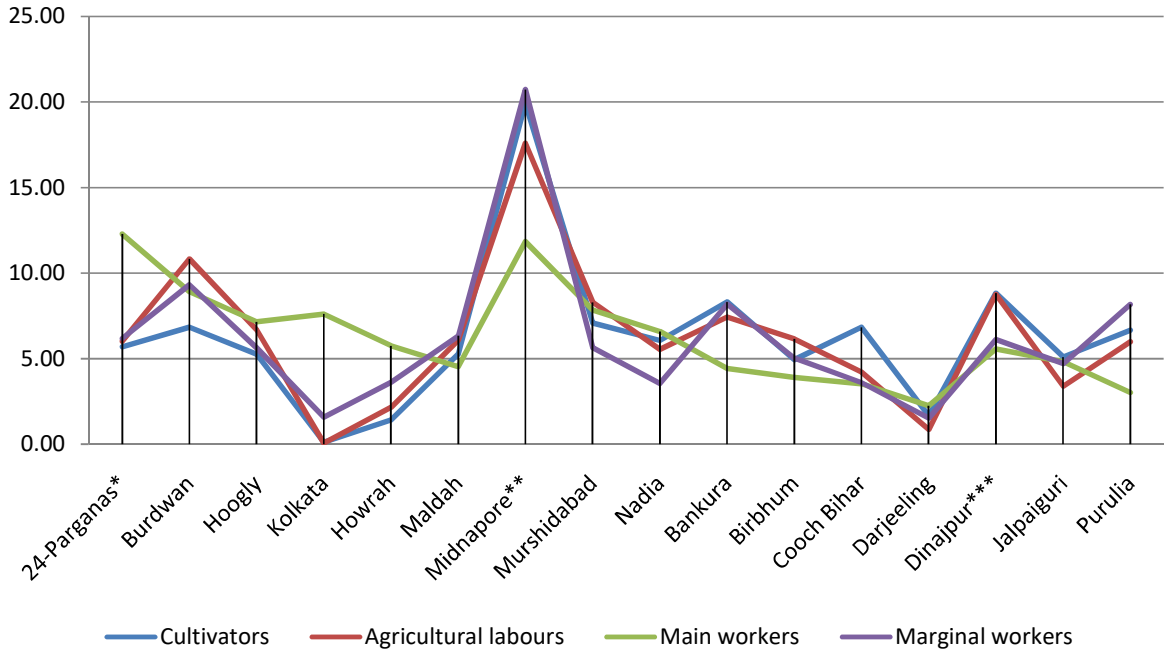


Figure 21: Percentages of workers across categories in West Bengal across districts

Source: Census of India, 2001 Govt of India.

Note: 24-Parganas* includes North & South 24 Parganas
Midnapore** includes East & West Midnapore
Dinajpur*** includes Uttar and Dakshin Dinajpur

4.4 Households below Poverty Line

Considering the last two poverty estimates by Planning Commission (Tendulkar Methodology) for 2004-05 and 2009-10, it is observed that the overall percentage of BPL population has come down from 34.20% to 26.70% (Figure 22). Although the proportion of urban poverty has come down, in absolute sense, the number of the urban poor has actually increased by 1.70 lakhs (Figure 23). This indicates that the decrease in urban poverty ratio may partly be attributed to the rise in urban population.

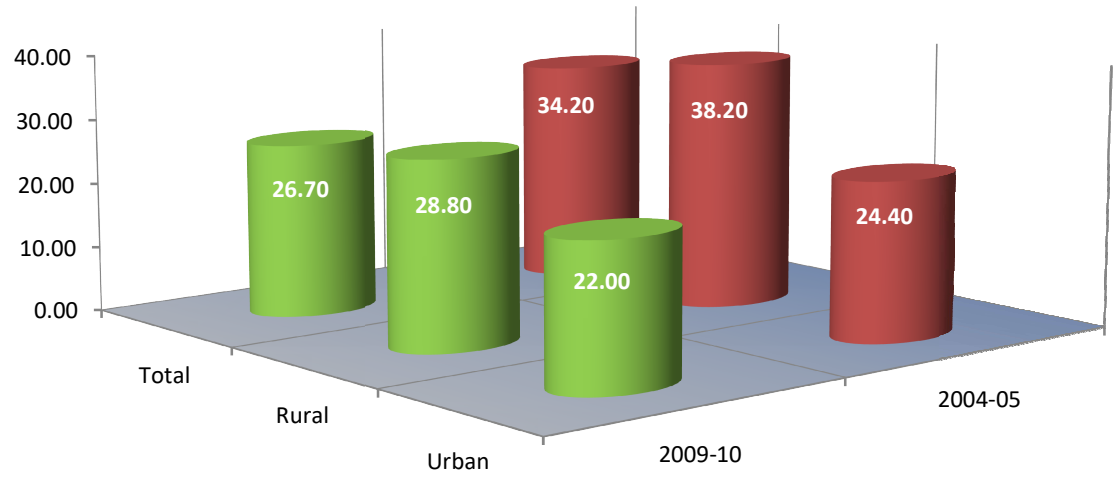


Figure 22: Percentage distribution of population BPL in West Bengal

Source: Press note on poverty estimate, 2009-10 by Planning Commission; March 2012 (Tendulkar Methodology);

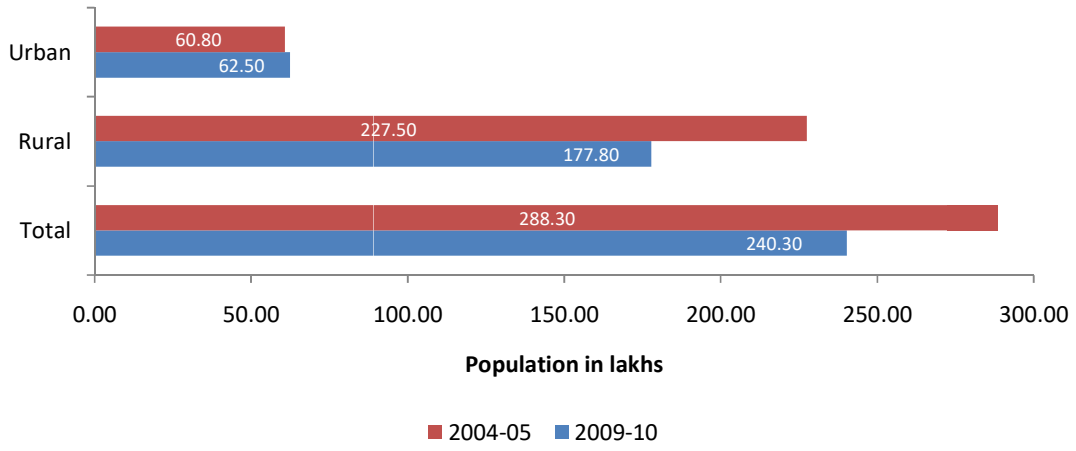


Figure 23: Absolute distribution of population BPL in West Bengal

Source: Press note on poverty estimate, 2009-10 by Planning Commission; March 2012 (Tendulkar Methodology);

4.5 Trends and Pattern in Banking

Table 1 depicts the penetration of scheduled commercial banks in West Bengal as in 2011. The number of commercial banks has increased by 32% from 4212 in 1991 to 5542 in 2011. Looking at the location-wise distribution of number of bank offices, it has increased faster in

river-bank districts than in the non-river bank districts which indicates higher economic activity in the former. Evidently Kolkata metropolitan area accounts for the maximum branches and most growth which is followed by North 24 Paraganas and Burdwan Depending on the economic activity and population density, a significant variation in the size of the population per bank is observed - from a minimum of 4 lakh in Kolkata to 12 lakh in Darjeeling to 32 Lakh in Uttar Dinajpur. Evidently except for Kolkata, all other districts have very poor banking network.

Table 1: Statistics related to Commercial Banks, West Bengal, 1991-2011

Source: Economic Review, 2010-11, West Bengal, Reserve Bank of India

	No of offices					Population per bank office ('000)				
	1991	2001	2009	2010	2011	1991	2001	2009	2010	2011
Burdwan	357	373	440	464	486	17	19	17	17	16
Birbhum	172	174	183	191	198	15	17	19	18	18
Bankura	164	166	175	183	188	17	19	20	20	19
Kolkata	907	988	1123	1185	1233	5	5	4	4	4
Purba Medinipur			209	220	227					22
Paschim Medinipur			309	319	324					18
Howrah	210	220	252	271	280	18	19	19	18	17
Hooghly	238	252	294	310	324	18	20	19	19	17
N 24 Pgs	333	375	493	538	569	22	24	21	20	18
S 25 Pgs	232	235	280	297	322	25	29	29	28	25
Nadia	179	180	201	216	224	21	26	27	25	23
Murshidabad	219	221	234	253	272	22	27	30	28	26
Uttar Dinajpur		83	89	91	95		29	34	34	32
Dakshin Dinajpur		64	68	73	74		23	26	25	23
Malda	140	146	154	156	159	19	23	26	26	25
Jalpaiguri	132	136	146	156	162	21	25	27	26	24
Darjeeling	96	109	142	148	154	14	15	14	13	12
Coochbehar	108	110	120	124	127	20	23	23	23	22
Purulia	111	112	121	123	124	20	23	23	23	24
West Bengal	4212	4424	5033	5320	5542	16	18	18	18	16

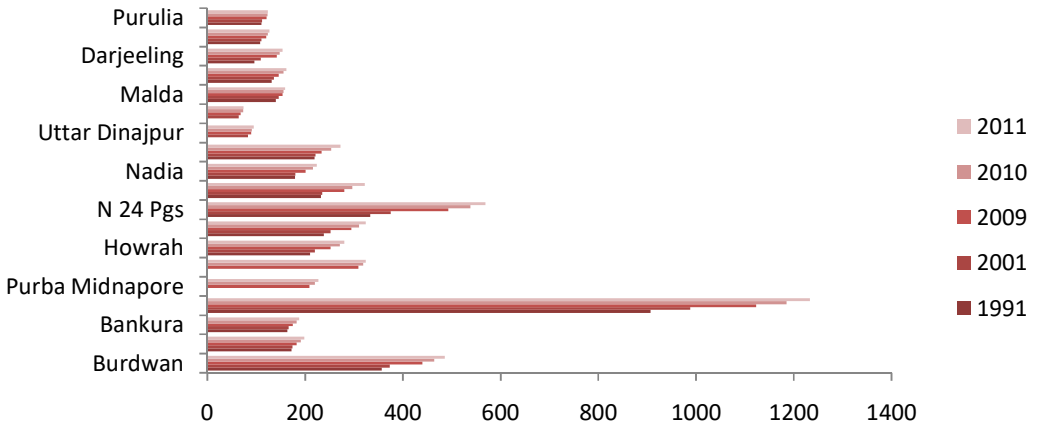


Figure 24: Distribution of number of commercial bank branches across districts in West Bengal, 1991 – 2011

Source: Economic Review, 2010-11, West Bengal, Reserve Bank of India

5. Social and Health Components

5.1 Education

5.1.1 Literacy Level

Figure 25 presents a comparative picture of the levels of literacy in West Bengal vis-à-vis India from 1951 to 2011. Interestingly, the literacy level for West Bengal has always been higher than the national average. However, during last sixty years, the national average went up by 55.7 % as against West Bengal's figure of 52.47%. This has led to the reduction in gap between the national and the state performances. However, West Bengal has to go a long way before it can claim to achieve full literacy.

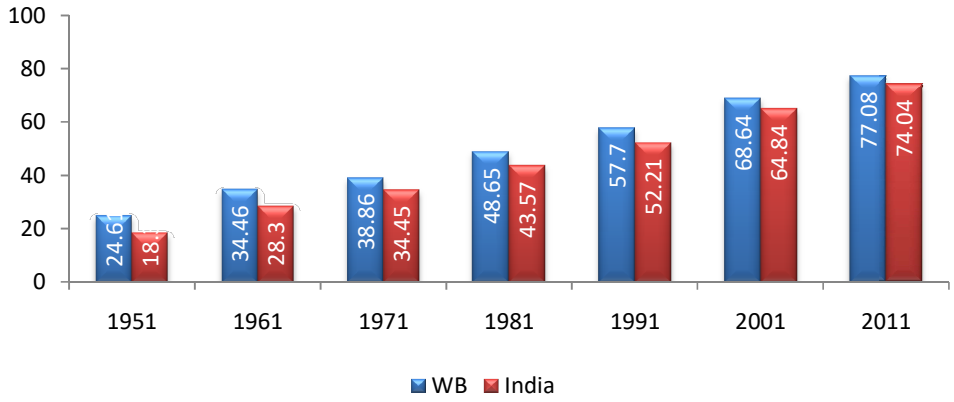


Figure 25: Literacy Rate (%), West Bengal and India, 1951-2011

Source: Economic Survey, 2011-12; Office of the Registrar General : 2011, India; M/Home Affairs; Planning Commision of india

District-wise literacy rates for the last two population censuses are presented in figure 26. It tends to suggests that on education front by and large, river-bank districts outperform the non-bank districts.

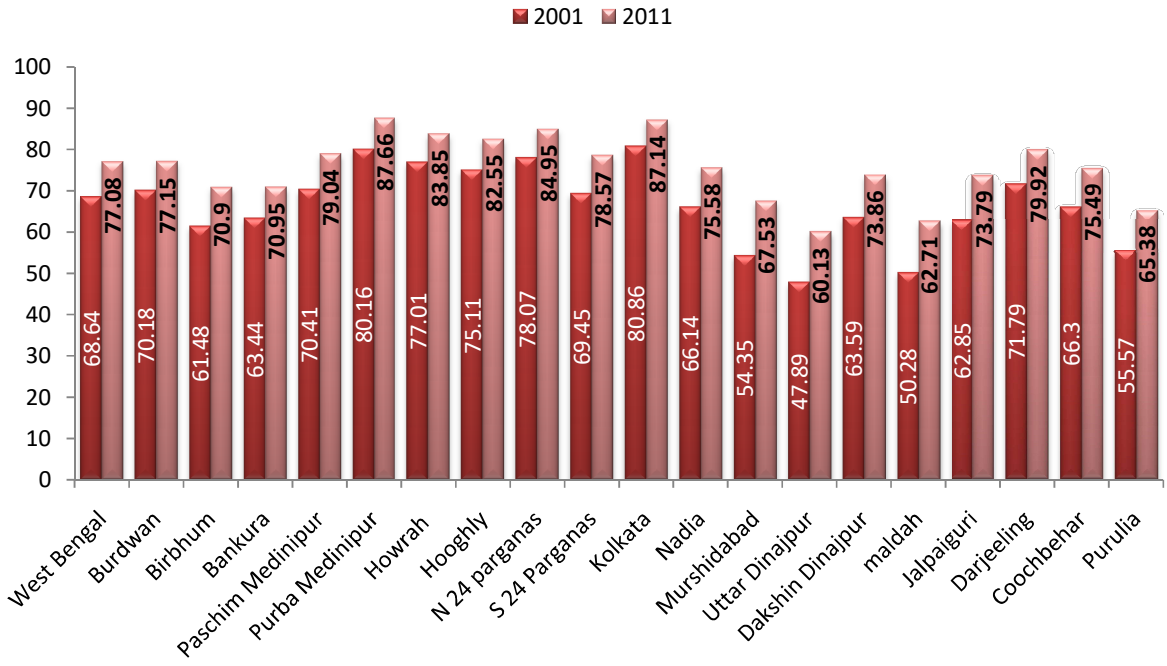


Figure 26: Literacy (Person) Rate (%) across Districts of West Bengal, 2001-2011

Source: Economic Survey, 2011-12; Office of the Registrar General : 2011,

As per Census 2011, the state wide male literacy rate is 82.67% while the female literacy rate is only 71.16%. However, as shown in Figure 27 and 28, during the last decade consistent improvements in both male and female literacy rates have been made across all the districts.

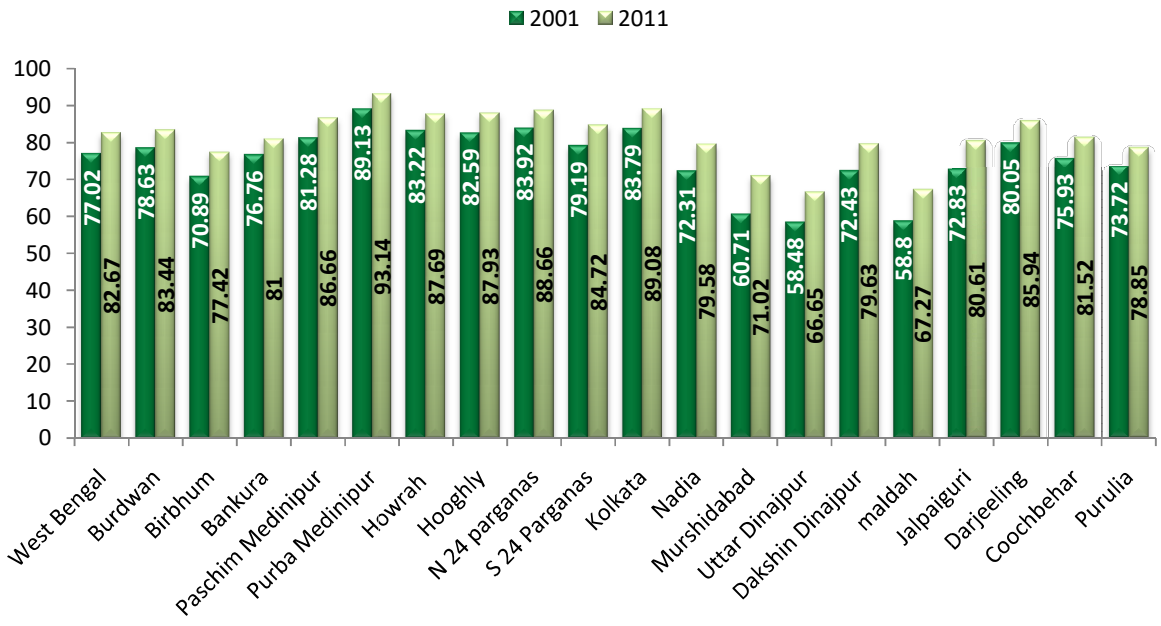


Figure 27: Literacy (Male) Rate (%) across Districts of West Bengal, 2001-2011

Source: Economic Survey, 2011-12; Office of the Registrar General : 2011,

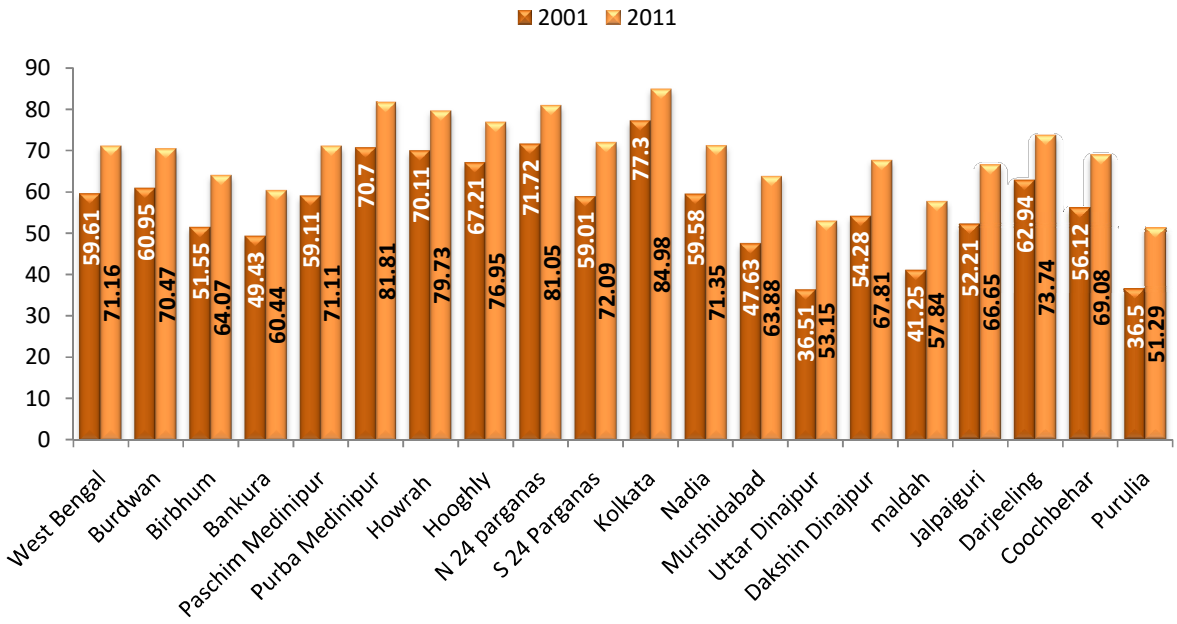


Figure 28: Literacy (Female) Rate (%) across Districts of West Bengal, 2001-2011

Source: Economic Survey, 2011-12; Office of the Registrar General : 2011,

5.1.2. Number of Educational Institutions

This section reveals the status of the public educational institutions in West Bengal. According to DISE 2009-10, West Bengal is having 66,081 primary schools as against 49,766 in 2008-09. The number of upper primary schools has risen from 1,063 in 2008-09 to 2,976 in 2009-10. The number of upper primary schools with Secondary/Higher Secondary provisions has increased to 7,887 in 2009-10 from 6,293 in 2008-09. Table 2 provides district-wise data on the number of government schools at primary, upper primary and secondary levels.

Table 2: District-wise government educational institutions in West Bengal, 2009-10

District	Primary		Primary with Upper primary		Primary with UP sec/HS		UP only		UP with sec/HS	
	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09
Bankura	3914	3463	0	0	2	1	234	73	430	372
Burdwan	5064	4001	0	1	12	8	142	51	762	724
Birbhum	3023	2372	0	0	6	2	163	1	358	1
Dakshin Dinajpur	1714	1171	3	0	6	3	47	5	158	149
Darjeeling	1306	774	4	3	9	8	103	46	76	74
Howrah	2411	2107	0	0	5	1	64	16	494	285
Hooghly	3282	2997	7	7	25	21	80	92	556	492
Jalpaiguri	3125	2038	0	0	2	5	162	55	287	240
Coochbehar	2517	1822	3	2	10	4	199	51	246	188
Kolkata	1503	1419	4	1	42	12	38	0	432	3
Maldah	2504	1887	0	0	14	3	119	25	309	236
Murshidabad	4750	3165	0	0	18	1	353	137	455	398
Nadia	3260	2598	1	0	7	2	136	40	417	397
N 24 PGS	4549	3622	0	0	24	40	168	59	877	808
Paschim Midnapur	7147	4672	0	11	10	59	250	98	722	566
Purba Midnapur	4698	3171	0	2	2	23	153	64	12	234
Puruliya	3403	2986	0	0	3	2	250	102	317	281
Siliguri	685	397	0	0	2	0	25	0	77	76
S 24 PGS	4893	3674	0	0	11	0	139	121	729	623
Uttar Dinajpur	2333	1430	0	0	5	0	151	27	173	146

Source: DISE

As shown in Table 3, a number of districts have recorded significant increase in privately run schools. This trend can be attributed to, among others, rapid rise in population, shortfall on the part of the government and the demand for apparently 'quality' education.

Table 3: District-wise private educational institutions in West Bengal, 2009-10

District	Primary		Primary with Upper primary		Primary with UP sec/HS		UP only		UP with sec/HS	
	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09
Bankura	107	72	3	1	4	2	2	3	1	2
Burdwan	471	343	108	62	71	38	12	13	7	15
Birbhum	445	95	44	5	9	1	19	41	4	336
Dakshin Dinajpur	325	343	29	27	7	2	3	7	4	4
Darjeeling	3	685	0	2	0	3	10	43	3	52
Howrah	353	938	61	134	26	49	6	63	6	190
Hooghly	414	320	70	47	42	20	16	12	8	4
Jalpaiguri	507	591	86	144	30	32	12	8	1	3
Coochbehar	715	780	37	35	5	4	22	17	2	0
Kolkata	256	65	121	27	130	116	22	61	73	456
Maldah	770	883	55	94	23	14	18	28	5	6
Murshidabad	397	199	65	26	12	7	30	6	7	3
Nadia	308	331	25	29	14	12	19	18	2	4
N 24 PGS	648	1521	64	208	51	97	27	46	13	48
Paschim Midnapur	616	461	44	41	26	19	22	12	5	7
Purba Midnapur	786	804	57	50	54	42	97	79	450	240
Puruliya	207	277	13	23	13	27	2	5	2	2
Siliguri	338	444	58	77	56	83	4	7	20	5
S 24 PGS	654	849	166	107	33	59	20	26	15	5
Uttar Dinajpur	277	352	46	71	11	14	4	5	1	5

Source: DISE

5.1.3. Enrolments

Table 4 depicts the gross and net enrollment at primary and secondary levels during 2007-08, 2008-09 and 2009-10. The data point to a consistent rising trend.

Table 4: District-wise enrolment ratio in educational institutions in West Bengal, 2009-10

District Name	Gross Enrolment Ratio (GER)						Net Enrolment Ratio (NER)					
	Primary			Upper Primary			Primary			Upper Primary		
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
Bankura	119.3	117.7	129.8	75.8	77.7	88.6	95	94	100	57.6	57.5	64.7
Burdwan	99.4	103.5	117.1	69.2	72.9	77.5	75.7	82.8	93.3	49.1	53.1	55.9
Birbhum	118.6	118.5	154.4	75.9	80.4	94.4	94.1	92.8	100	56.1	59.7	69.2
Dakshin Dinajpur	123.9	132.2	169.5	79.6	87.3	101.1	96.6	100	100	61.3	66.1	73.4
Darjeeling	49.5	41.7	52.4	29.5	29.4	35.9	34.9	30.8	37.2	20.6	21.4	24.3
Howrah	108.7	101.1	108.7	68.9	73.2	78.5	84.9	77.8	85.7	51.2	52.6	57.6
Hooghly	101.8	101.8	105.2	71.8	74.8	78.8	74.1	81.2	81.2	45.4	48.4	53.3
Jalpaiguri	134.8	133.7	160.7	82.4	87.6	101.4	87	84.9	100	54.8	59	70.8
Coochbehar	149.4	146.5	175	88	91.3	108.3	96.5	93.8	100	63.2	65.5	76.1
Kolkata	55.5	55.5	72.1	47.4	47.6	59.7	40.3	40.2	56.5	33	33	43.8
Maldah		166.2	175	66.7	70.7	102.1		100	100	46.8	48.9	70.7
Murshidabad	130.5	131.8	175	69.7	75.2	102.1	100	100	100	50.7	54.6	76.6
Nadia	120.4	115.5	127.8	82.1	87.5	99.9	88.6	91.6	99	82.1	87.5	99.9
N 24 PGS	95.5	88.7	95.3	67.1	68.3	74.5	61.3	61.2	75.5	47	49.7	56.7
Paschim Midnapur												
Purba Midnapur												
Puruliya	145.7	146.7	156.6	70.1	73.8	84.4	100	100	100	51.8	54.6	60
Siliguri												
S 24 PGS	121.7	115.7	143.2	72.2	75.4	86.4	87.1	92.2	100	72.2	75.4	86.4
Uttar Dinajpur	154.8	158.1	175	60	64.5	90.8	100	100	100	42.2	44.7	63.3

Source: DISE

5.2. Drinking Water and Sanitation

In urban areas of West Bengal, tap water constitutes the single most prominent source of drinking water. The two other important sources are hand pumps and tube wells (Figure 29). Among the river bank districts, Kolkata with about 85% of the urban households having access to tap water from treated sources ranks the highest. This ratio declines to 59% in Hooghly and between 42-40% in south 24 Paraganas and Howrah (figure 21).

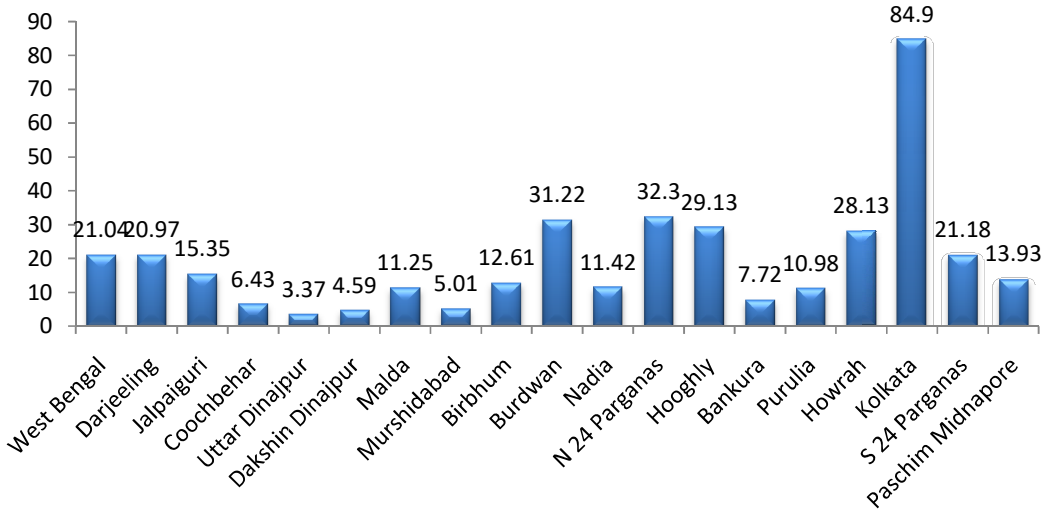
Table 5: Main sources of drinking water in West Bengal

District	Main sources of drinking water (%)									
	Tap water		Well water		Hand pump	Tube well	spring	River/ canal	Tank/ pond/ lake	Other sources
	Treated source	Untreated source	Covered well	Uncovered well						
West Bengal	21.04	4.38	0.66	5.36	50.13	16.66	0.51	0.26	0.18	0.01
Darjeeling	20.97	13.09	4.09	20.51	7.52	7.25	23.13	0.46	1.04	1.89
Jalpaiguri	15.35	6.41	2.45	37.26	24	11.34	0.47	0.81	0.3	1.57
Coochbehar	6.43	6.29	0.49	6.94	58.7	19.3	0.01	0.17	0.041	1.6
Uttar Dinajpur	3.37	1.95	0.21	1.62	75.36	16.04	0.01	0.08	0.06	1.31
Dakshin Dinajpur	4.59	3.1	0.2	0.6	68.92	21.81	0.01	0.05	0.06	0.68
Murshidabad	5.01	1.99	0.36	0.48	75.72	15.14	0.01	0.14	0.11	1.05
Birbhum	12.61	3.27	0.79	4.75	59.71	18.16	0.04	0.32	0.11	0.23
Burdwan	31.22	4.86	0.88	5.31	42.58	14.03	0.06	0.2	0.15	0.72
Nadia	11.42	4.77	0.27	0.2	67.32	14.69	0.01	0.08	0.07	1.16
North 24 Paraganas	32.3	6.56	0.27	0.18	40.2	19.15	0.06	0.13	0.26	0.89
Hooghly	29.13	5.73	0.44	0.23	43.68	19.63	0.06	0.23	0.19	0.67
Bankura	7.72	4.26	1.04	10.45	52.16	23.26	0.13	0.52	0.14	0.3
Purulia	10.98	1.19	1.17	27.65	35.27	20.1	0.59	2.42	0.31	0.31
Howrah	28.13	3.88	0.61	0.53	45.35	21.06	0.03	0.04	0.12	0.25
Kolkata	84.9	3.21	0.26	0.18	4.17	5.74	0.11	0.15	0.37	0.9
South 24 Paraganas	21.18	2.2	0.26	0.06	60.53	15.41	0.01	0.03	0.11	0.22
Paschim Medinipur	13.93	5.62	1.04	12.57	47.53	18.44	0.09	0.21	0.11	0.45

Source: Compiled from household amenities data of Census 2011.

The following figure 29 gives an idea about the availability of treated tap water in different districts of West Bengal. The striking feature of this figure is that apart from Kolkata, where treated tap water reaches out to 84.9 percent of the population, only two other districts namely Burdwan (31.22%) and North 24 Paraganas (32.3%) have crossed the 30% access level of treated water. It is strikingly low in some districts such as Uttar Dinajpur (3.37%), Dakshin Dinajpur (4.59%), Murshidabad (5.01%), Coochbehar (6.43%) and Bankura (7.72%).

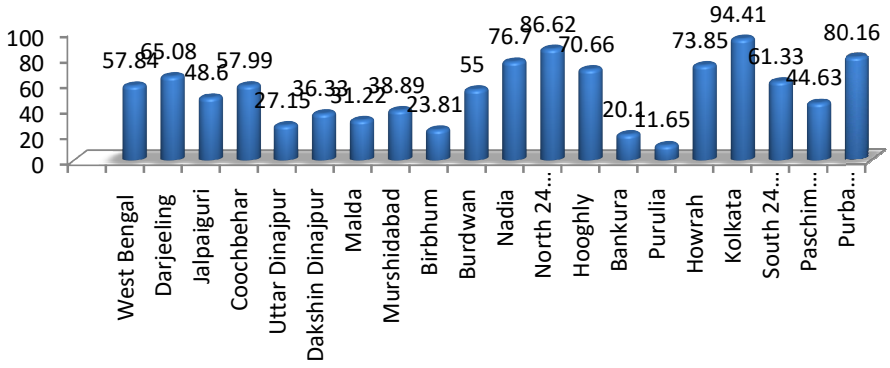
Figure 29: Percentage availability of treated tap water in different districts of West Bengal



Source: Compiled from household amenities data of Census 2011

Figure 30 depicts the district-wise picture of the access to latrine facilities in the state. On this front also, as expected, Kolkata leads the list with 94.4% access followed by North 24 Paraganas (86.62%), Purba Medinipur (80.16%) and Nadia (76.7%). However there are several lagging districts e.g., Purulia (11.65%), Bankura (20.1%), Birbhum (23.81%) and Uttar Dinajpur (27.15%) .

Figure 30: Households having Access to Latrine Facility (%), West Bengal, 2011



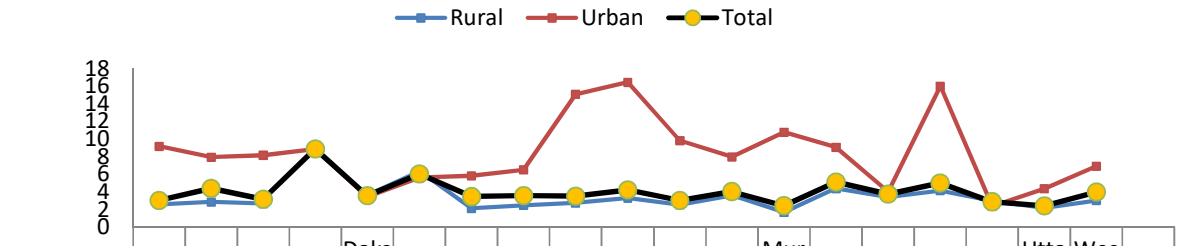
Source: Compiled from household amenities data of Census 2011

5.3. Health Status

Health status of the state may be probed on the basis of certain select parameters like crude death rates (CDR) and infant mortality rates (IMR). Figure 31 presents district-wise crude death rate across the state during 2001. Surprisingly, the CDR in urban areas is found to be

much higher and ranges around 15-16% in Coochbehar, Purulia and Jalpaiguri. As regards IMR, the state wide average in 2011 was 32 – with rural areas reporting 33 and urban areas 26. Under-five mortality rate was 38 in the state in 2011. In all such indicators of health, rural areas of the state are found to be lagging behind significantly compared to the urban areas.

Figure 31: District-wise crude death rate in West Bengal, 2001



	Bankura	Burdwan	Birbhum	Kolkata	Dakshin Dinajpur	Darjeeling	Howrah	Hooghly	Jalpaiguri	Coochbehar	Maldah	Midnapore	Murshidabad	Nadia	N 24 Pgs	Purulia	S 24 Pgs	Uttar Dinajpur	West Bengal	
Rural	2.5	2.8	2.6		3.5	6.3	2.1	2.4	2.7	3.2	2.5	3.5	1.6	4.3	3.4	4.1	2.9	2.1	3.0	
Urban	9.1	7.9	8.1	8.8	3.4	5.6	5.8	6.5	15.	16.	9.8	7.9	10.	9.0	4.0	16	2.3	4.3	6.8	
Total	3.0	4.3	3.1	8.8	3.5	6.0	3.4	3.5	3.5	4.2	3.0	4.0	2.4	5.1	3.7	5	2.8	2.4	3.9	

Source : www.indiastat.com / compiled from the statistics released by Directorate of census Operations, Govt of West Bengal

Table 6: Child aged (0-4 yrs) and infant mortality indicators in West Bengal, 2011

Particulars	Total	Rural	Urban
Child Mortality Rate	8	8	8
Under-5 Mortality Rate	38	41	29
Infant Mortality Rate	32	33	26
Neo-natal Mortality Rate	22	23	17
Early Neo-Natal	18	19	14
Late Neo-Natal	4	4	3
Post Neo-Natal Mortality rate	10	10	9
Peri-natal mortality rate	24	25	19
Still birth rate	6	6	5

Source: SRS statistical report , 2011

6. Summary and Implications

The report provides an understanding of three major dimensions: demographic characteristics, the economic scenario, and educational and health status of West Bengal. While attempting to attain efficient management of the basin area, it may be important to consider these aspects carefully.

6.1 Demographic Characteristics

- Over the last 11 decades the population of the state has increased sharply by 540% and stands at 9.13 Crore in 2011. Most of the river-bank districts have shown lower rate of growth in population. It is also interesting to note that the Kolkata area has reached saturation and has recorded negative population growth rate.

- The last decade has witnessed a sharp increase in the urban population of West Bengal, rising to 31.89% of the total population in 2011. About 68% of the total and about 84% of the urban population of the state is concentrated in 10 river-bank districts.

- The population density of West Bengal in 2011 has reached 1029/sq km which is second highest after Bihar. However the national average in 2011 stands at 382/sq km. Kolkata with 24,252 persons/sk. Km probably represents one of the most densely inhabited areas on the earth. Adjoining districts of Howrah (3300), North 24 Paraganas (2463), Hooghly (1753) , Murshidabad (1334) Also exhibit severe population pressure on land and water resources.

6.2 Economic Indicators

- During the last decade, the state has made good progress in terms of GSDP. Likewise the per-capita income has also maintained an increasing trend. River bank districts including Kolkata have shown remarkable increase in per capita income.

- There has been continuous decline in the share of primary sector in the GSDP while share of tertiary sector has continued to witness an increase. However, around 40% of the state's main workers are engaged directly in agriculture as cultivators or agricultural labourers.

- While the percentage BPL population in rural and urban areas has come down, the absolute number of urban poor has gone up.

6.3 Social and Health Indicators

- Except for Kolkata, access to safe drinking water through household tap is rather low.

- Access to sanitation (household / community latrine) is low at around 58%.

6.4. Implications

- High population pressure in the river bank districts is going to have a direct impact on the Ganga River in terms of per capita availability of drinking water and domestic water in the coming years.

- Increased per capita income as well as increasing participation in primary sector in river bank districts may have a direct linkage with the cropping pattern, fertilizer usage and irrigation practices in these places. Tendency to grow high yielding variety crops may lead to more usage of water. There may also be a tendency to use more pesticide and fertilizers indirectly posing a threat to the river ecosystem. Increased momentum in secondary sector in the river bank districts and especially in already industrialized ones, can have direct bearing on the river in terms of release of more effluents to the river. The problem may multiply manifold in the river bank districts with the increased population pressure and growing industry and household demand for water.

- There is a considerable gap in infrastructure for sanitation which will continue to make adverse impact on the river water quality. This needs to be urgently addressed to appropriate paradigms and interventions.

- Majority of households in the basin area do not have access to safe drinking water which can be a major cause of concern from public health point of view.

- Rise in the incidence of poverty in urban areas indicates the mismatch in the momentum of poverty alleviation programs and that of population growth.

- Rise in the number of the urban poor in West Bengal has several adverse consequences in terms of environment, public health and quality of life.

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Status of Urbanization and Industrialization

in Upper Ganga Basin (Uttarakhand)

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology


IIT Bombay


IIT Delhi


IIT Guwahati


IIT Kanpur


IIT Kharagpur


IIT Madras


IIT Roorkee

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Framework for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialogue in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. A list of persons who have contributed directly and names of those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction

The accelerated pace of urbanization and industrialization in the plain/semi-plain districts of Uttarakhand, especially after statehood and implementation of new industrial policy, has serious implication for maintaining environment and carrying capacity of the river system. Since, urbanization, industrialization and the water pollution are inter-related issues; these are required to be addressed in an integrated manner. There are several anthropogenic and socio-economic factors associated with the growth of urbanization and industrialization that affect the quantity and quality of water resources. For example, growth and composition of GDP, household consumption expenditure, pattern of industrialization, production and consumption practices, occupational structure, rural-urban migration and other socio-demographic outcomes are some of the important indicators of water demand as well as its pollution. Therefore, in order to prepare a holistic GRBMP, it is important to understand the trends and pattern of urbanization and industrialization along with the associated factors. Keeping these aspects in view, this report concentrates on the pattern of urbanization and industrialization in the Upper Ganga Basin (Uttarakhand).

2. Methodology

The present report is based on the secondary data collected from various published sources, which include Statistical Diaries, and Abstracts published by the Uttarakhand and Uttar Pradesh governments, NSSO reports, Annual Survey of Industries (ASI), Population Censuses, CSO, Department of the Economics and Statistics, Ministry of Statistics and Programme Implementation (MOSPI) and other published sources. In this report, analysis of data is done at two levels—districts and State. For analyzing various indicators, time series district-wise data have been used. Further, the districts are also classified into plain and hill regions to know the difference in the pattern of urbanization and industrialization in two regions. Region-wise analysis is done to draw meaningful inferences from planning point of view.

Map 1 depicts the geographical location of the state of Uttarakhand with all its 13 districts. The state shares the international boundary with Tibet in the wide northeast and with Nepal in the southeast. The state is also bounded by state of Himachal Pradesh in the north-west and Uttar Pradesh in the south.



Map 1: Location and district map of Uttarakhand

3. A Brief Profile of the Upper Ganga Basin (Uttarakhand)

Uttarakhand is located between latitudes 29°5'-31°25'N and longitudes 77°45'-81°E covering a geographical area of 53,485 sq.km of which 93 percent is mountainous. The region comprises of two administrative units viz., Garhwal (northwest portion) and Kumaon (southeast portion). Its capital is located at Dehradun. About 34,650 sq. kms area is under forest cover. The recorded forest area constitutes 64.8 percent of the total reported area, though the actual cover based on remote sensing and satellite imagery information is only 44 percent. Uttarakhand is a valuable fresh water reserve, having over fifteen important rivers and over a dozen glaciers. The state has 13 districts, 78 tehsils, 95 development blocks, 671 Nyaya Panchayats, 7,227 Gram Panchayats and 15,761 inhabited villages (Government of Uttarakhand, 2011). Figure 1 presents a location and district map of the state.

According to Population Census 2011, the state accounts for 8.49 million population with 4.33 million males and 4.16 million females. SC and ST constitute 1.52 million and 0.26 million respectively. The decennial growth rate of the population in the state has declined from 24.2% during 1981-91 to 19.2% during 2001-2011. It has sex ratio of 963 and literacy rate of 79.6 percent with 88.3 percent literacy among males and 70.7 percent among females. Literacy rates among SCs and STs are relatively lower at 63.4 percent and 63.2 percent respectively (Population Census 2011). As per the 2011 census, population density is 189 persons per square kilometres. The workforce constitutes 37 percent of total population, of which 74 percent are main workers and 26 percent are marginal workers. Out of the total workforce, 1.57 million are cultivators (including main and marginal cultivators), 0.26 million are agricultural labourers, 0.07 million people work in household industries and 1.23 million workers are engaged in other activities.

Agriculture covers 7.81 lakh hectares of land, out of which 57% is in hill region, while the plain

region constitutes 43%. About 55 percent of the cultivated land is rain-fed. In the hill area irrigation coverage is only around10 percent whereas in the plain areas it is around 85 to 90 percent. The average size of land holding is around 0.68 hectare in the hills and 1.77 hectare in the plains. Of the total 9.26 lakh farmers of the state, small and marginal farmers constitute around 88 percent (Government of Uttarakhand, 2011). The subsistence nature of agriculture in the hill districts provides nothing but a low and unstable annual income to the people, causing a sizeable out-migration of male members, leaving behind a large number of female- headed households.

4. Urbanization: Growth and Dimensions

4.1 Urbanization in Uttarakhand

Despite hilly topography and difficult setting, as shown in Figure 2, over the decades, the level of urbanization in Uttarakahand at 30% is found to be very close to that of the national average and it has been rising almost in synch with the latter. In fact the rise in the percentage of urban population in the state from 1991 to 2011 is slightly more than that recorded across the country (7.58 % versus 5.45%).

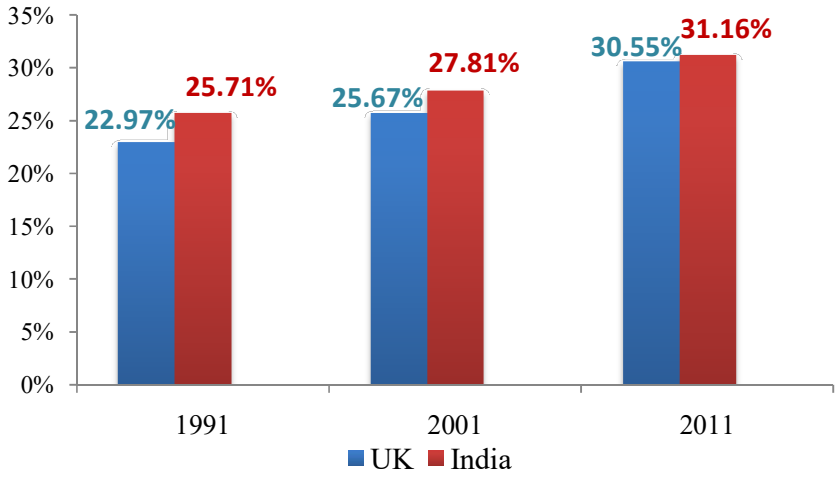


Figure 2: Urbanization trend in Uttarakhand

However, the level of urbanization in the state varies significantly across regions and districts. Initially, urbanization was largely concentrated around the major pilgrim towns and administration headquarters; however, with the spread of trade & commerce, industry and agribusiness, it gradually and swiftly spread in the plain/semi plain regions of the state. Figure 2 presents graphical illustration of variation in the level of urbanization across 13 districts in year 2001 while Table 1 presents estimates since 1971. It is noticed that urbanization is mostly a phenomenon in four districts of the state, namely, Haridwar, US Nagar, Dehradun and Nainital, which are by and large in the plains and which together constitute more than 80 per cent of the urban population of the state. Highest urbanization is observed in Dehradun district (50-60%), followed by Haridwar, Nainital and U.S. Nagar (40-50%). Three hill districts, namely Uttarkashi, Rudraprayag, and

Bageshwar given their hilly topography have less than 10 percent urbanization, while in the rest of the hill districts it is between 10- 20%.

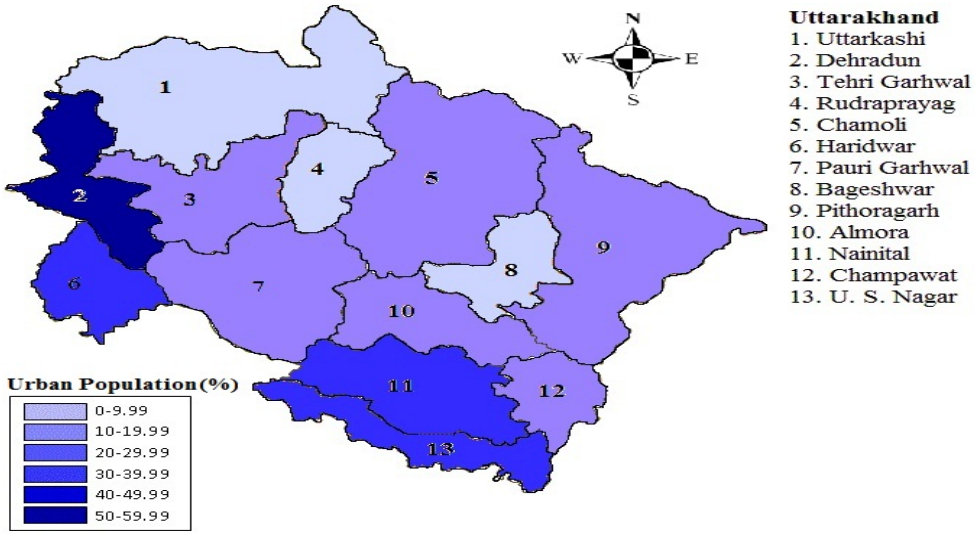


Figure 2: Level of Urbanisation across Districts of Uttarakhand, 2011

At the state level (excluding Haridwar district), urban population went up from 14.7% in 1971 to 23% in 2011. However, the growth in urban population was limited to only new districts, located in the plain/semi plain region. Table 1 clearly shows that the level of urbanization in 2011 was lowest in Bageshwar (3.50%), followed by Rudraprayag (4.19%) and Uttarkashi (7.35%); while it was found highest in Dehradun (55.90%), followed by Nainital (38.94%), Haridwar (37.77%), and U.S. Nagar (35.58%) – the latter four districts comprising the plains. Figure 3 presents district-wise urbanization trend over the last two decades which again establishes that the process is concentrated in the four plain/semi plain districts of the state.

Table 1 : Percentage of Urban Population in Uttarakhand and India, 1971-2011

District	1971	1981	1991	2001	2011
Plains					
Dehradun	47.08	48.86	50.19	52.94	55.90
Hardwar	---	---	30.96	30.84	37.77
Nainital	22.13	27.49	32.66	35.27	38.94
Udham Singh Nagar*	---	---	---	32.62	35.58
Hills					
Almora	5.21	6.28	6.45	8.64	10.02
Bageshwar*	---	---	---	3.13	3.50
Chamoli	4.17	8.01	9.01	13.69	15.11
Champawat*	---	---	---	15.04	14.79
Garhwal	6.3	9.82	11.86	12.89	16.41
Pithoragarh	3.8	5.52	7.42	12.94	14.31

District	1971	1981	1991	2001	2011
Rudraprayag*	---	---	---	1.20	4.19
Tehri Garhwal	2.65	4.13	5.68	9.90	11.37
Uttarkashi	4.07	6.95	7.08	7.77	7.35
Uttarakhand	---	---	**23.17**	**25.67**	**30.55**
Uttarakhand exl. Hardwar	**14.69**	**18.3**	**21.7**	**24.51**	**23.35**
India	**19.91**	**23.31**	**25.72**	**27.78**	**31.16**

Note: *The districts of Rudraprayag, Bageshwar, Champawat and U.S. Nagar have been carved out from the districts of Chamoli, Almora, Pithoragarh and Nainital, respectively. Hence, the figures for urban population are included in the respective parent district for 1971, 1981 and 1991.

Source: Registrar General of India (2001), Census of India, 2001, Provisional Population Totals of Uttarakhand, Paper 1 of 2001, Series 6, New Delhi.

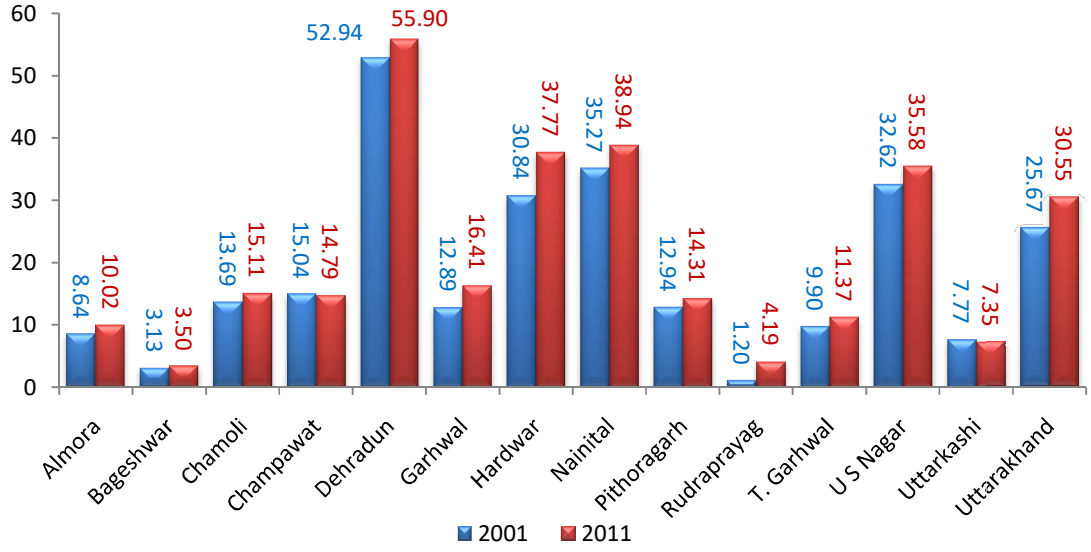


Figure 3: District-wise Percentage of Urban Population in Uttarakhand

Notwithstanding lower urbanization in the hill districts, it is noteworthy that these are the areas which witness significant inflow of pilgrims and tourists in the summer seasons which leads to spikes in urban population and puts significant stress on the limited municipal infrastructure. Such spikes lead to the problems of water pollution and waste disposal and are emerging a major area of concern. Unfortunately there are no reliable estimates of the number of tourists visiting different centres of pilgrimage / tourist attraction.

4.2 Trends and Pace of Urbanization in Uttarakhand

For the two latest Census' the population trends in the seven main cities in the state are presented in Figure 4 below. It is noted that none of these cities falls in the category of metropolitan city. Dehradun, the capital, is the largest city in the state with a population of 7.2 lakh in 2011. Second largest towns are Haridwar and the urban agglomeration of Haldwani-Kathgodam each having population of around 3.1 lakh in 2011. The well known town of Roorkee

with over a century old technical university (converted into an IIT in the late nineties) has population of 2.74 lakh (2011) and during the last decade it recorded growth of 13.65% which is highest among all the cities in the state. Rudrapur is another town which is witnessing significant investments in industrial and urban sectors and has registered significant population growth during the last decade. In line with the urbanization trend, evidently all the seven major cities/towns of the state are located in the plain region. Barring two, all the other five towns are emerging as urban agglomerations – indicating uncontrolled urbanization in adjoining rural settlements.

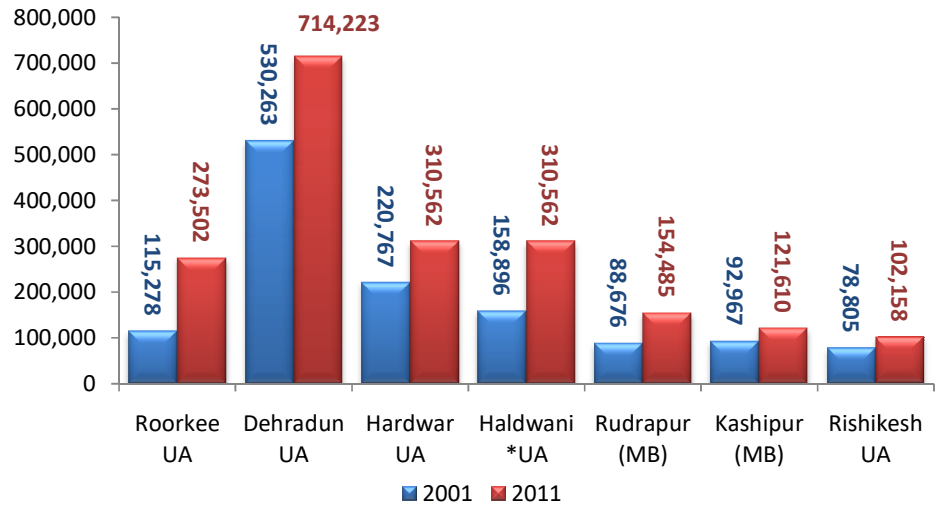


Figure 4: Population Trends in Urban Agglomerations and Cities in Uttarakhand (2001 & 2011)

As per the Census 2001 in all there were 86 towns across the state. As per the Census norms on population size these towns are classified into six categories, as presented in Table * below and in Figure 4. Between 1991 and 2001, nine new settlements were added as Census towns. Among various categories, for Class-V corresponding to population size 5000-10,000 a 100% increase was recorded between 1991 and 2001. On the other hand there was a sharp decline in number of Class-VI towns, which is attributed to graduation of hitherto smaller towns to the next higher category.

Table *: Number of Towns under Population Categories

Category	Population Range	Number of towns (Census 1991)	Number of towns (Census 2001)
I	> 1 Lakh	3	3
II	50,000-100,000	3	5
III	20,000-50,000	15	16
IV	10,000-20,000	16	16
V	5,000-10,000	14	28
VI	< 5,000	26	18

	Total	77	86

Source: Census of India 2001 and 2011, Government of India

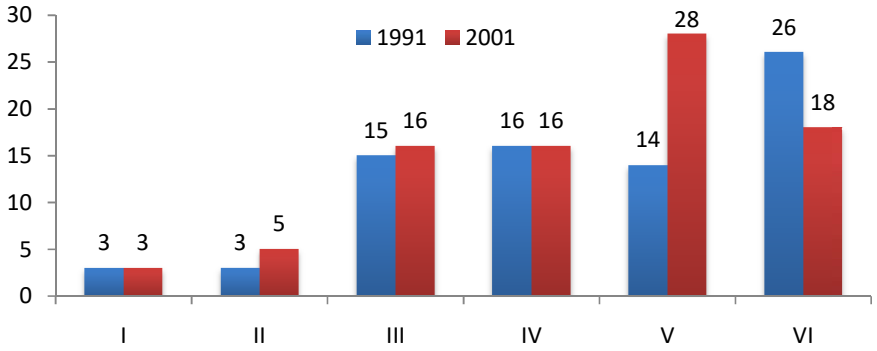


Figure 4: Increase in Number of Towns from 1991 to 2001, Uttarakhand.

Table 2 shows district-wise and category wise number of towns in the State. All the largest towns are found only in the plains viz., in the three districts of Dehradun (Dehradun City), Haridwar (Haridwar City) and Nainital (Haldwani city). All the second order cities are also located in the plain region. It is evident that the hill regions account for most of the small size towns which are classified under Class-VI.

Apart from Dehradun which is the capital of the newly created state, the towns of Haldwani, Kashipur, Rudrapur, Jaspur, Ramnagar, Haridwar, and Roorkee have grown rapidly during the last two decades. This growth has taken place as a result of impetus to expansion of industries and services in the state. This growth is invariably going to create more pressures on urban amenities, leading to implications on the environment.

Table 2: Class-wise No. of towns in different Districts of Uttarakhand

Districts/ Uttarakhand	I		II		III		IV		V		VI	
	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
Plains												
Dehradun	1	1	0	2	3	2	4	3	2	4	3	2
Hardwar	1	1	1	1	2	2	3	4	1	2	--	--
Nainital	1	1	--	--	2	2	--	--	1	4	4	1
U S Nagar	--	--	2	2	3	5	3	2	6	6	1	2
Sub-total	3	3	3	5	10	11	10	9	10	16	8	5
Hills												
Almora	--	--	--	--	1	1	1	1	--	--	2	2
Bageshwar	--	--	--	--	--	--	--	--	1	1	--	--
Chamoli	--	--	--	--	--	--	2	2	1	2	3	2
Champawat	--	--	--	--	--	--	1	1	1	2	2	1
Garhwal	--	--	--	--	2	2	1	1	1	2	1	1
Pithoragarh	--	--	--	--	1	1	--	--	0	2	2	1

Rudra Prayag	--	--	--	--	--	--	--	--	--	--	2	2
Tehri Garhwal	--	--	--	--	1	1	0	1	0	3	4	2
Uttarkashi	--	--	--	--	--	--	1	1	0	1	2	1
Sub-total	0	0	0	0	5	5	6	7	4	13	18	12
Uttarakhand	3	3	3	5	15	16	16	16	14	29	26	17

Source: Census of India, 2001

5. Urban Amenities

5.1. Sources of Drinking Water

Lack of access to safe drinking water causes morbidity and many times contributes to high mortality rates due to diarrhea, cholera, typhoid and other water-related diseases, especially among vulnerable groups like women and children. Therefore access to safe drinking water and good sanitation facility are two key indicators of a healthy society. Accordingly district-wise distribution of urban households by sources of drinking water is presented in Table 3. As per this information it is noted that at the state level, slightly over two third of the urban households have access to tap water as the source of drinking water. Hand pump with 22% coverage occupies second position while wells, tube wells, ponds/lakes constitute a very small fraction. Contribution from 'other sources' in the last column comprising springs, rivulets, etc. is high in the hill districts, however their share varies significantly across districts. Over the last decade of 2001-2011 slight increase in piped water supply has been made in almost all districts and it is noted that a number of districts both in the plains and the hills have achieved coverage in excess of 80%.

Table 3: Urban Households by Sources of Drinking Water in Uttarakhand

Districts	Tap		Well		Hand Pump		Tube-well/ Borehole		Tank/ Pond/ Lake		Other Sources	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Plains												
Dehradun	83.10	84.67	0.80	0.31	10.80	11.11	__	2.04	0.70	0.34	1.20	0.91
Hardwar	40.60	40.47	0.40	0.19	58.00	54.05	__	3.84	0.00	0.15	0.60	1.21
Nainital	73.20	80.05	0.50	0.60	7.30	8.36	__	4.15	1.70	0.54	6.50	4.23
U S Nagar	32.40	36.76	0.20	0.20	64.40	58.46	__	3.28	0.20	0.10	1.10	1.16
Hills												
Almora	75.90	80.46	2.50	2.76	1.30	4.18	__	0.03	1.40	1.40	15.60	8.56
Bageshwar	57.10	79.42	2.90	3.97	1.30	3.22	__	0.05	2.50	2.00	28.10	8.57
Chamoli	82.80	85.88	1.40	1.32	0.60	1.12	__	0.01	1.10	0.69	7.70	7.74
Champawat	63.60	65.29	2.20	3.97	11.90	16.65	__	1.15	4.20	2.16	11.70	7.81
Garhwal	79.70	85.94	1.00	0.93	0.90	2.85	__	1.24	1.80	1.17	9.50	5.65
Pithoragarh	75.50	79.74	2.60	2.94	2.10	4.57	__	0.01	2.50	1.60	13.00	8.24
Rudraprayag	83.60	88.07	2.90	1.86	0.80	2.22	__	0.01	2.00	0.94	6.80	4.86
T. Garhwal	74.80	77.28	2.50	2.23	2.20	5.59	__	0.04	2.10	1.58	7.40	4.96

Districts	Tap		Well		Hand Pump		Tube-well/ Borehole		Tank/ Pond/ Lake		Other Sources	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Uttarkashi	75.60	80.50	0.80	1.79	0.60	1.89	__	0.01	0.90	0.80	13.30	8.84
Uttarakhand		68.22		1.13		22.02	__	1.97		0.73		3.97

Source: Census of India 2001, 2011

All values are in %.

5.2. Access to Toilet Facilities

Access to toilet facility here refers in relation to an improved household sanitary toilet which does not have potential to spread faecal contamination or affect public health. As per the latest available data, percentage of urban households without an individual toilet has declined from 21% in 2001 to under 7% in 2011. In the urban areas, as shown in Figure 6, the coverage is well in access of 90% while in the rural areas it varies from 40-80% while the average statewide coverage is reported to be around 68%. Among the districts there are significant variations which can be attributed to, among others, difficult topography and access; however lower average coverage in selected districts in plains, particularly in Haridwar and US Nagar could be due to usual challenges of unreformed behavior.

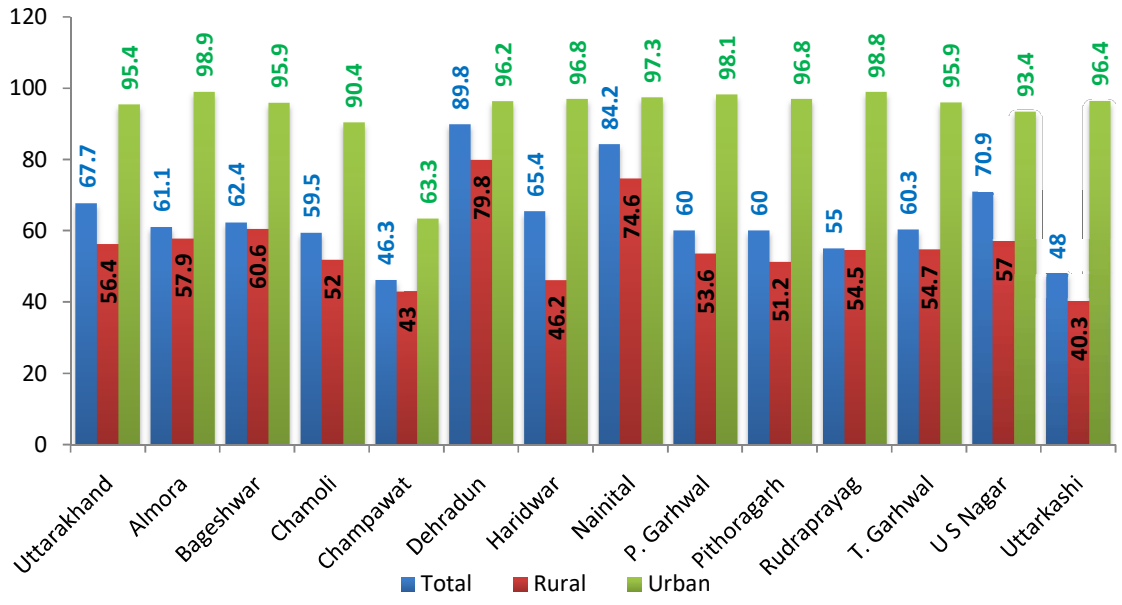


Figure 6: Households having Access to Toilet Facility (%), Uttarakhand, 2010

Figure *5 presents district-wise sanitation deficit scenario in the urban areas. The district of Champawat has the highest deficit with 15-20% households not have individual latrines/toilets. Chamoli and Bageshwar districts have a deficit of 10-15%. In the three districts of Pithoragarh, Dehradun and Tehri Garhwal urban sanitation deficit is the least – falling in the range of 0-5%. In the rest of the districts in the plains and the hills the deficit is between 5-10%.

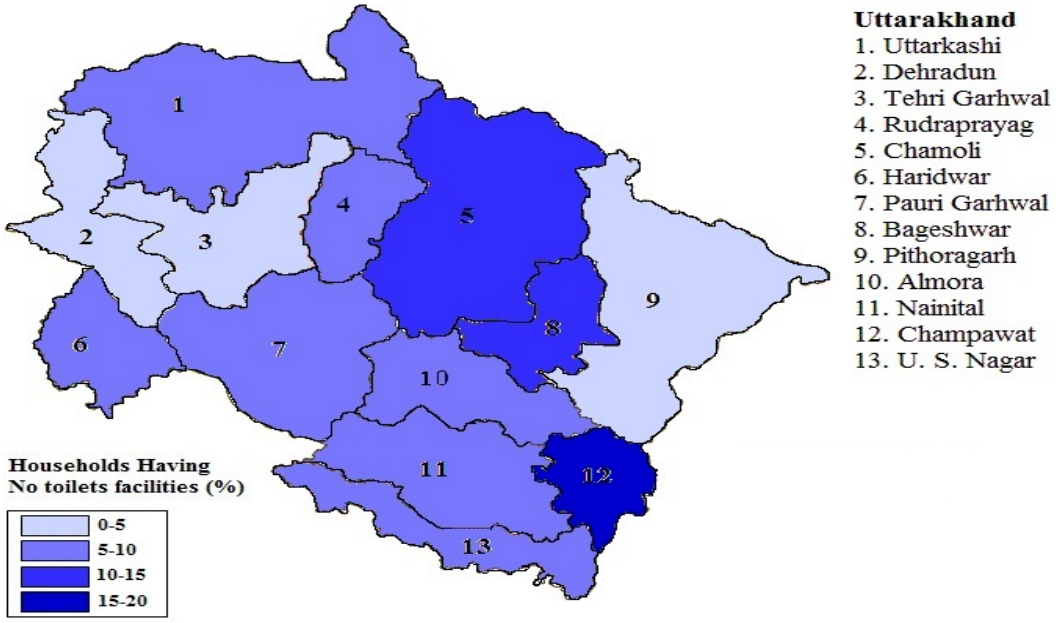
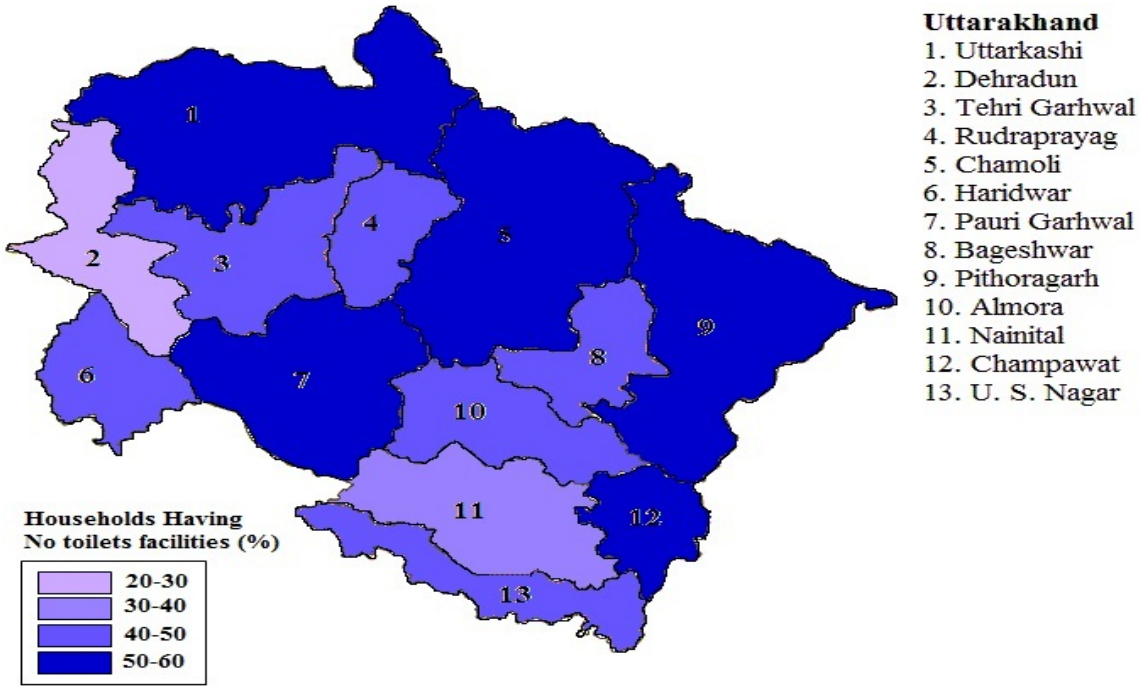


Figure *5: Urban Households without Toilet in Uttarakhand, 2011

On the other hand on the rural landscape, it is noted from Figure *6 that in a majority of the hill districts household sanitation deficit is between 40-60% and therefore there is a long way to go. On this front even in one of the districts in the plains viz., Haridwar the deficit is rather low at 40-50%. Only Dehradun and Nainital districts have reported better situation where the deficit has come down to 20-30%.



Map 6: Rural Households without Toilets in Uttarakhand , 2011

Types of latrines

Generally there are three types of household toilets, viz., pit latrines (twin pit pour flush), water closet toilets (linked to septic tanks) and other toilets. As shown in Table 6, it is noted that sanitation coverage with pit latrines has increased significantly across all the districts. This can be attributed to the impetus to sanitation under the Total Sanitation Campaign during the decade of 2001 – 2011. On the other hand, considering higher cost of construction of septic tanks, coverage of WC toilets has remarkably declined in all except two districts.

TABLE 6: URBAN HOUSEHOLDS WITH INDIVIDUAL TOILET FACILITIES

District	2001				2011			
	Pit Toilet	Water Closet toilet	Other Toilets	No Toilet	Pit Toilet	Water Closet toilet	Other Toilet	No Toilet
Almora	26.56	57.81	3.13	12.50	85.56	5.87	0.46	8.11
Bageshwar	47.46	0.00	49.15	3.39	85.54	4.43	0.00	10.03
Chamoli	43.43	22.66	7.94	25.97	68.22	18.83	0.43	12.52
Champawat	27.37	28.42	23.16	21.05	77.20	2.36	0.34	20.10
Dehradun	34.25	18.54	22.48	24.73	88.76	5.42	1.05	4.77
Pauri Garhwal	47.34	14.79	23.08	14.79	84.57	9.72	0.39	5.32
Hardwar	18.74	31.23	31.23	18.81	81.69	9.95	1.00	7.36
Nainital	29.64	31.52	25.00	13.83	90.00	2.06	2.72	5.22
Pithoragarh	24.70	30.54	31.05	13.71	80.10	16.30	0.12	3.48
Rudraprayag	0.00	20.00	10.00	70.00	73.39	18.12	0.04	8.44
T. Garhwal	21.52	34.18	11.81	32.49	91.25	4.63	0.04	4.08
U S Nagar	16.82	25.14	34.20	23.84	86.61	4.43	1.01	7.95
Uttarkashi	58.18	25.45	7.27	9.09	87.19	4.03	0.26	8.52
Uttarakhand	29.16	24.96	24.70	21.17	85.92	6.54	1.11	6.43

Source:Indiastat.com

Between the urban and rural areas there is a wide technology divide. In the case of rural areas, the dominant option is single or twin pit pour flush latrine that was typically provided under the TSC. However in the urban areas the preferred option is septic tank. Sewerage system is not widely available which can be attributed to challenging topography particularly in the hills. However, even in the case of septic tanks also one does not find a robust septage management system in place and it is likely that this could be getting indiscriminately discharged into water course. This has severe implications to drinking water facilities and streams/river water downstream in the hill areas. In this regard there is an urgent need to provide the required infrastructure in small and medium towns for septage treatment.

5.3. Urban Drainage System

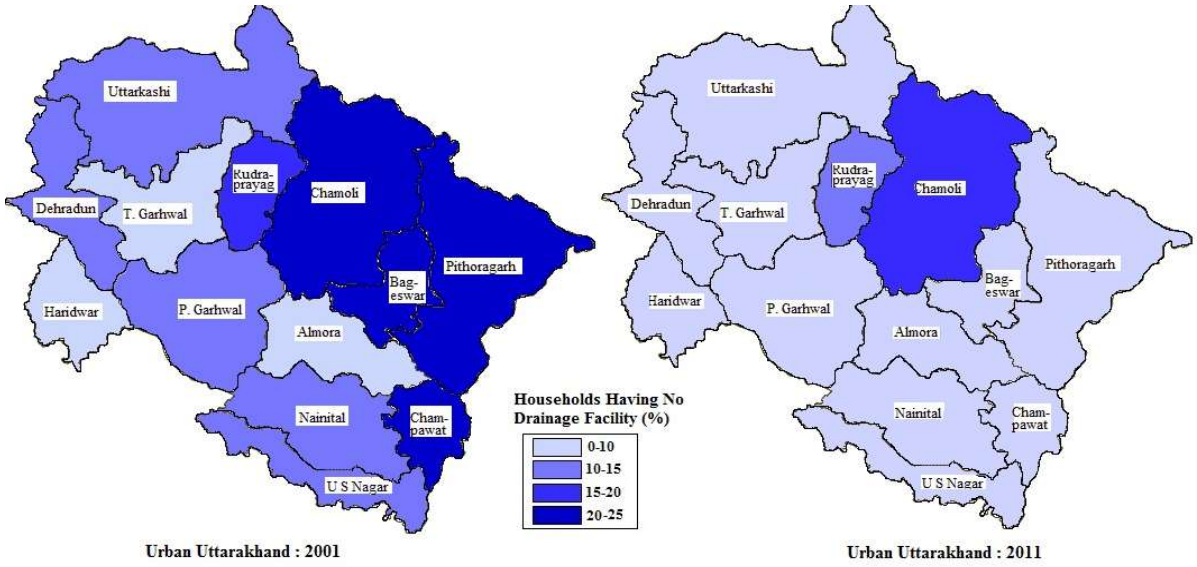
In this section drainage refers to conveyance system for sullage i.e., brown water generated from households and commercial establishments. This does not refer to sewerage system or to storm water drainage system.

As per the data presented in Table 7 it is noted that over the last decade of 2001-2011 a considerable progress has been made in improving the coverage. By 2011 almost 93% households are reported to have drainage and a majority has moved from open drainage to closed drainage system, thereby offering improved aesthetics and better quality of life. While the extent of improvement varies across districts there is not much difference between hill and plain regions. However, between 2001 and 2011, drainage facilities have improved faster in the hill than the plain region of the State. For instance, percentage of urban households having closed drainage system in hill region has increased from 27.05 in 2001 to 48.32 in 2011, a net increase of 21.27% point, whereas the corresponding increase in plain region is only 10.46% point. This implies that infrastructure strengthening in hill towns has received greater attention.

Table 7: Distribution of urban households with drainage facilities

District/Region	Closed Drainage		Open Drainage		No Drainage	
	2001	2011	2001	2011	2001	2011
Dehradun	34.58	53.57	51.13	36.81	14.30	9.62
Hardwar	37.29	39.27	57.60	56.47	5.10	4.26
Nainital	35.67	48.57	53.54	45.46	10.79	5.98
U S Nagar	12.05	15.62	77.04	78.05	10.91	6.33
Plain Region	**30.55**	**41.01**	**58.56**	**52.00**	**10.89**	**6.99**
Almora	9.83	60.55	82.00	36.26	8.17	3.18
Bageshwar	31.91	65.02	42.52	30.50	25.58	4.48
Chamoli	6.74	24.32	69.90	56.32	23.35	19.35
Champawat	8.36	18.39	68.94	71.76	22.70	9.85
Pauri Garhwal	15.25	40.32	72.46	53.01	12.29	6.67
Pithoragarh	32.31	54.95	44.63	38.37	23.07	6.68
Rudraprayag	16.46	46.38	67.63	40.20	15.91	13.43
T. Garhwal	39.23	76.22	54.25	20.75	6.51	3.03
Uttarkashi	28.36	47.11	59.88	46.64	11.76	6.25
Hill Region	**27.05**	**48.32**	**60.61**	**44.07**	**12.34**	**7.62**
Uttarakhand	**13.53**	**42.26**	**75.01**	**50.65**	**11.47**	**7.10**

Figure *7 presents the significant improvements in drainage facilities for the urban households. Except for Chamoli and Rudraprayag, in all other districts, only less than 10 percent urban households in 2011 did not have access to drainage facilities, while in 2001, more than 10 percent urban households in most of the districts of the state did not have any kind of drainage facilities.



Map 7: Urban Households without drainage facility

5.4. Cooking Fuel options

Figure 7 shows the percentage distribution of households in the State by sources of cooking fuel. In rural areas, firewood is the major source of cooking fuel in both the censuses. It is followed by LPG and cow-dung cakes. Contrary to this, LPG is the major source in urban areas, followed by firewood. The percentage shares of households having LPG as cooking fuel in both rural and urban areas have significantly increased in 2011 over the 2001, while the share of households using cow-dung and kerosene has declined. Table 7 also indicates that firewood in rural areas and LPG in urban areas are the main sources of cooking fuel. Percentage share of households having other fuels such as biogas, electricity, coal, etc. is quite low both in rural and urban area.

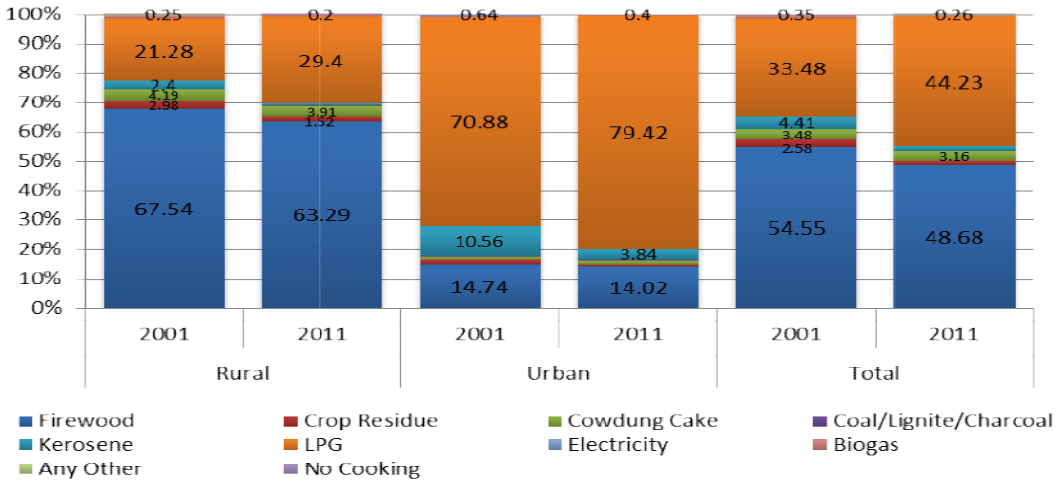


Figure 7: Percentage Distribution of Households by Sources of Cooking Fuel in Uttarakhand

Table 8 highlights the region-wise percentage distribution of households by sources of lighting. Electricity is the major source of lighting in the state. It is followed by kerosene. However, the percentage of households having access to electricity as a source of lighting varies across rural and urban areas. On an average, percentage of urban households having electricity is much higher than their rural counterparts. Region-wise percentage distribution of households having access to electricity shows that percentage of such households is slightly higher in the plain than the hill region. The percentage of households having electricity as a source of lighting has increased in 2011 over 2001 in both the regions, while the share of households using kerosene has declined. Households using solar energy, other oil, and any other source of lighting comprise a negligible fraction.

Table 8: District-wise Percentage of Households by Source of Lighting in Uttarakhand

Region	Location	Electricity		Kerosene		Solar energy		Other oil		Any other		No lighting	
		2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Hills	Total	59.63	84.08	34.04	12.93	5.17	2.44	0.14	0.17	0.68	0.10	0.34	0.29
	Rural	51.63	82.25	40.77	14.41	6.28	2.75	0.17	0.18	0.75	0.11	0.40	0.31
	Urban	93.15	97.81	5.82	1.83	0.53	0.08	0.04	0.09	0.37	0.05	0.08	0.14
Plains	Total	59.40	89.28	38.44	9.67	1.26	0.29	0.11	0.15	0.28	0.26	0.51	0.35
	Rural	54.16	84.00	43.68	14.68	1.41	0.44	0.10	0.21	0.18	0.30	0.39	0.37
	Urban	84.67	96.21	13.19	3.10	0.16	0.08	0.15	0.08	0.75	0.22	1.08	0.31
Uttarakhand	Total	59.46	87.04	37.38	11.08	2.20	1.22	0.12	0.16	0.37	0.19	0.47	0.32
	Rural	53.56	83.05	43.00	14.53	2.62	1.69	0.12	0.19	0.31	0.20	0.39	0.34
	Urban	86.90	96.49	11.26	2.88	0.26	0.08	0.12	0.08	0.65	0.19	0.82	0.28

Source: Compiled from Indiastat.com

6. Nutritional Status of Households

Table 9 presents trend in MPCE (monthly per capita expenditure) on food and non-food items in rural and urban areas. At current market prices, average MPCE in rural areas has increased from Rs.647.15 in 2004-05 to 1694.67 in 2009-10, while in urban areas, it has increased from Rs.978.26 to Rs.1643.16 during the same period. This shows that net increase in MPCE is much higher in rural than the urban areas. For instance, the ratio of MPCE in urban areas to rural areas has declined from 1.51 in 2004-05 to 0.97 in 2009-10, suggesting that disparity between rural and urban areas with regard to average MPCE has declined during this period. Another important

conclusion that can be drawn is that the percentage share of food items in the total MPCE has declined in both rural and urban areas. However, decline is much faster in rural than urban areas. This implies that consumption pattern in rural areas of the state has shifted significantly towards non-food items; while in urban areas the shift is not so dramatic.

Table 9: Trend in per capita monthly consumption expenditure on food and non-food items in Uttarakhand (nominal values)

Year	Average MPCE (MRP) (Rs)		Percentage share of Food in MPCE		Percentage share of Non-food in MPCE	
	Rural	Urban	Rural	Urban	Rural	Urban
2004-05	647.15	978.26	53.45	47.13	46.55	52.87
2009-10	1694.67	1643.16	41.11	42.6	58.89	57.4

Source: 61st and 66th NSS round.

Table 10 presents details of per capita intake of calories, protein and fats in rural and urban households in Uttarakhand and India. The data reveal that in 2004-05, per capita calories intake of rural households was higher than that of urban households in India, while in Uttarakhand, it was just reverse. However, in 2009-10, per capita calories intake of rural households of the state exceeded that of the urban households. On the basis of per capita calorie intake, it can be concluded that the nutritional status of households in the state is far better than the all-India average. However, as far as protein intake is concerned, it has registered a decline in both rural and urban areas of the state, while it has increased across India.

Table 10: Trends in per capita intake of calories, protein and fats in Rural and Urban Households in Uttarakhand

Year	Calorie (K.cl)				Protein (MG)				Fat (MG)			
	Uttarakhand		India		Uttarakhand		India		Uttarakhand		India	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
2004/05	2160	2205	2047	2020	61.6	62.8	57	57	41.3	48	35.5	47.5
2009/10	2271	2141	2147	2123	58.6	55.5	59.3	58.8	48.9	48.4	43.1	53

Source: 61st and 66th NSS round.

Per capita intake of fats in rural and urban areas both at Uttarakhand and all-India levels have increased. However, the increase was higher in rural areas than the urban areas. For instance, in rural Uttarakhand, it has increased from 41.3 milligram in 2004-05 to 48.9 milligram in 2009-10, while urban areas with an average of 48 milligram recorded an insignificant increase.

It is also relevant to note that the percentage share of cereals in the total calories intake has declined between 2004-05 and 2009-10 in rural and urban areas both. In Uttarakhand, the share of cereals has declined from 62.46% in 2004-05 to 52.96% in 2009-10 in rural areas and from 56.62% to 55.91 in urban areas (Table 11). At all-India level, the percentage share declined from 67.541% to 60.38% in rural areas and from 56.08% to 50.37% in urban areas between the same years. This implies that share of non-cereals food items in the total calories intake has increased. The increase was significant in rural areas of the state. In 2009-10, about 47% and 44% of total calories requirements, respectively, in rural and urban households are met from consumption of non-cereal food items, such as milk & milk products, meat, fish & eggs and fruits & vegetables, etc. This indicates significant changes in food preferences and general improvement in affordability of rural and urban population.

Table 11: Trend in the percentage share of cereals and other food items in the total calories Intake

Year	Uttarakhand				India			
	Rural		Urban		Rural		Urban	
	Cereals	Others	Cereals	Others	Cereals	Others	Cereals	Others
2004-05	62.46	37.51	56.62	43.38	67.54	32.31	56.08	43.84
2009-10	52.96	47.04	55.91	44.09	60.38	39.5	50.37	49.55

Source: 61st and 66th NSS round.

Percentage share of different food items in the total protein intake in rural and urban areas in Uttarakhand and India is shown in Table 12. In rural areas of the state, the share of cereals and pulses in the total protein intake has declined and so is the case with the share of meat, fish & eggs. On the other hand the share of milk and milk products and other food items have registered an increase in their share in total protein intak. Similar pattern is also observed in rural India. Only difference is that in rural India, share of meat, fish and eggs in the total protein intake has increased, while it has decreased in rural Uttarakhand.

Table 12: Percentage share of different food items in the total protein intake

Source of Protein	Uttarakhand		India	
	2004-05	2009-10	2004-05	2009-10
	RURAL			
Cereals	64.05	57.52	66.37	60.18
Pulses	12.03	10.06	9.47	8.28
Milk & milk Products	14.88	15.89	9.28	9.37
Meat, Fish & eggs	1.75	1.57	3.98	5.85
Others	7.28	14.95	10.84	16.25
	URBAN			

Cereals	59.18	59.34	56.16	51.25
Pulses	13.87	12.12	11	10.14
Milk % milk Products	13.86	16.28	12.33	12.53
Meat, Fish & eggs	2.49	2.73	5.47	7.57
Others	10.6	9.52	15.04	18.46

Source: 61st and 66th NSS round.

In urban Uttarakhand, the share of cereals in the total protein intake has almost remained stagnant between 2004-05 and 2009-10, while at all-India level, it has declined. In case of pulses, the share has declined in the state as well as in India. As far as milk & milk product group is concerned, it is observed that its share in the total protein intake has increased significantly in the state, while at all-India level, it shows only a marginal increase. No major increase in the percentage share of meat, fish & eggs in the total protein intake is observed in urban Uttarakhand, while in urban India, the increase was found significant. Share of other items has declined in the state, while it shows an increase in India. It can be concluded that distribution pattern of protein intake across different food items is slightly different in Uttarakhand when compared to the all-India pattern. For instance, share of milk and milk products in the total protein intake in both rural and urban households in Uttarakhand was much higher than that in India, whereas, share of meat, fish and eggs in the total protein intake in both rural and urban households in India was much higher than that in Uttarakhand.

7. Urban Occupational Structure

Occupational patterns of urban workforce in the state for 2004-05 and 2009-10 are presented in Figure 8. Self-employment constitutes the largest share, followed by regular wages/salary and other employment. Share of self-employment in the total employment has increased slightly, whereas wage/salary employment had registered a slight decline. However the data do not offer insight whether increase in self-employed was due to increase in distress kind of self-employment or a growth-induced self-employment. For instance, if workers do not get regular salary or wage-employment due to shrinking of jobs in the organized sector, they would be forced to undertake petty and lesser gainful self-employment in the informal sector. Contrary to this, if well-educated and trained workers initiate self-employment activities in the emerging sectors, this kind of employment would be desirable for the economy as these activities would also generate gainful wage employment for other workers as well. A slight increase in the share of casual employment indicates deterioration in the quality of employment in the state. Other kind of employment has also declined in the state.

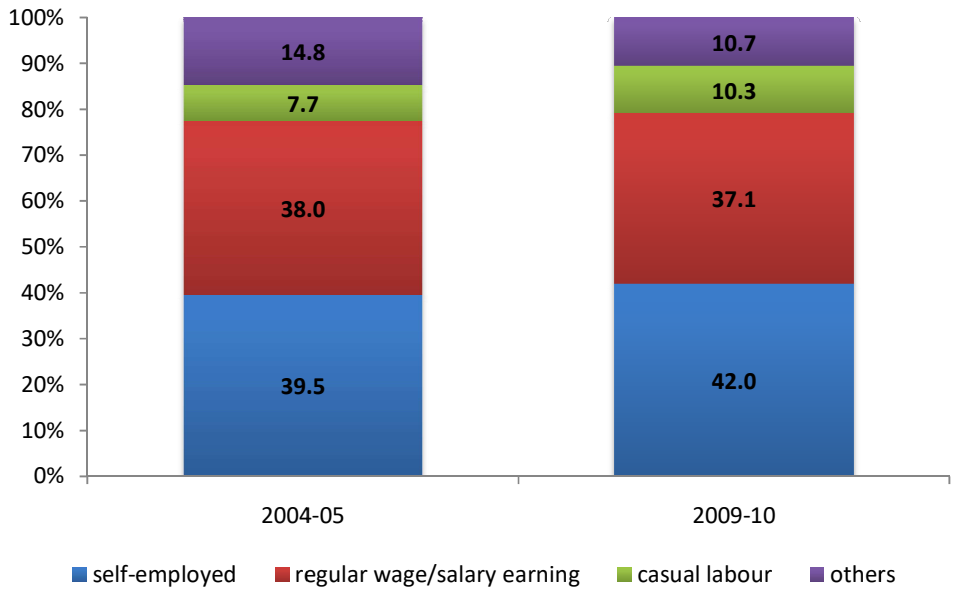


Figure 8: Household Main Occupation (%) in Urban areas, Uttarakhand, 2004-2010

8.0 Migration

Urbanization depends on three factors—natural growth of population, rural to urban migration and reclassification of rural areas as urban in course of time. Figure 9 shows the intra-district, inter-district, inter-state and international migration by place of birth in Uttarakhand and India. About 50% of total migration in the state is within the district (31.12% males and 59.39% female), whereas, percentage of intra-district migration in India was 59.19% (47.32% males and 64.14% female). Higher proportion of females in intra-district migration is mainly due to marriages. Inter-district migration of population was much lower in Uttarakhand than that in India. Contrary to this, percentage share of inter-state migration in the total migration was much higher (28.79%) in Uttarakhand than in India (13.79%). Further, percentage share of inter-state migration was much higher among males than females. Out-migration is the major issue in Uttarakhand. In absence of adequate employment opportunities in the state, especially in hill districts, the workforce of the state move outside the state to earn livelihood. International migration was also observed higher in the state than in India.

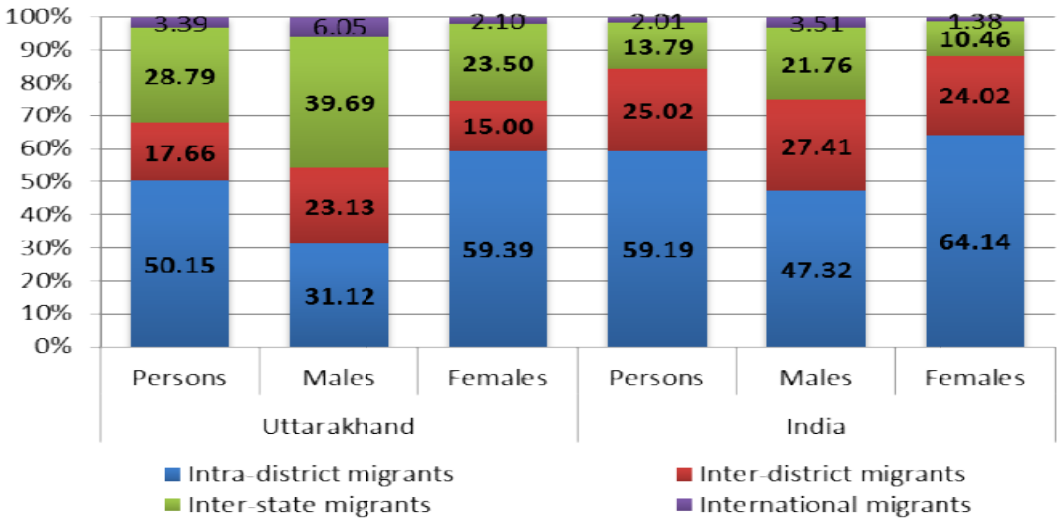


Figure 9: Migration (%) by Place of Birth in Uttarakhand and India, 2001

Figure 10 shows migration by place of residence in Uttarakhand and India under four categories as shown in the Figure. It is evident from the Figure that while share of intra-district and inter-district migration in the total migration by place of last residence was much higher in India than that in Uttarakhand; share of inter-state and international migration was much higher in Uttarakhand than that in India. For example, as against 27.99% share of inter-state migration in the total migration of the state, the corresponding percentage in India was only 13.09%. This again testifies that a majority of people of the state out-migrate to get better employment opportunities.

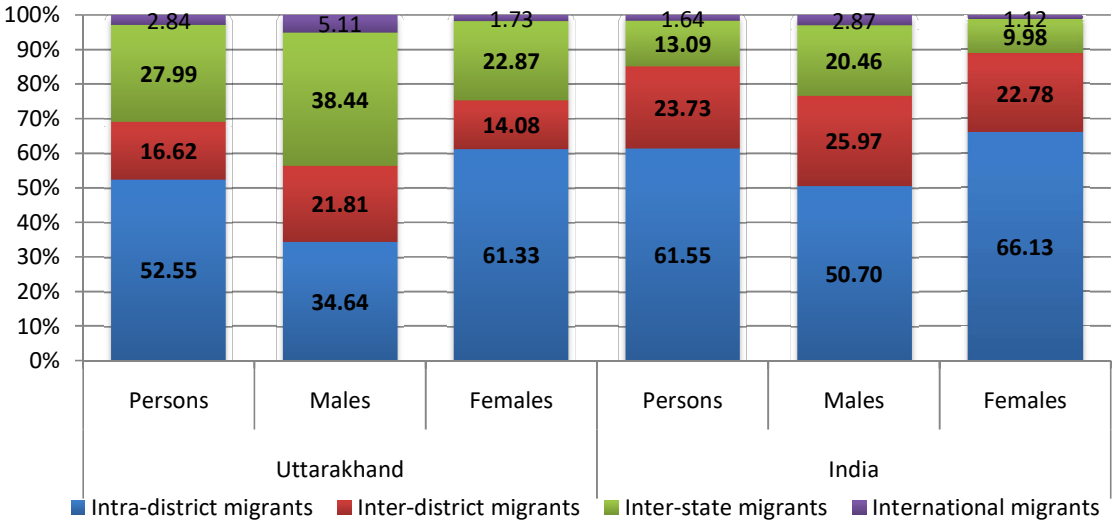


Figure 10: Migration (%) by Place of Last residence in Uttarakhand and India, 2001

Table 13 shows share of male and female migrants in total migrants by migration streams in Uttarakhand and India. Share of female migrants in total intra-district migration was much higher than their male counterparts. In Uttarakhand, females constituted 88.54% share in the rural to rural; 63.23% in urban to rural, 53.13% in rural to urban, and 50.67% in urban to urban intra-

district migrants. Share of female migrants in the total inter-district migrants was also found higher than male migrants. However, percentage share of female migrants varies across migration streams. For instance, proportion of female migrants was as high as 65.33% in case of rural to rural migration and as low as 47.64% in case of rural to urban migration. Similarly, proportion of female migrants in total inter-state migrants was found highest (61.09%) in case of rural to rural migration and lowest (47.47%) in case of rural to urban migration. One of the main reasons of relatively higher percentage share of females in total migrants is marriage. Moreover, females also migrate with the males as housewives when males migrate for employment. At all-India level also, similar pattern of migration was observed. The percentage share of female migrants was observed much higher than their male counterparts in India under all the streams, except for inter-state rural to urban migration.

Table 13 : Migration (%) by Streams in Uttarakhand and India, 2001

Migrants	Migration streams	Uttarakhand		India	
		Males	Females	Males	Females
Intra-district migrants	Rural to Rural	11.46	88.54	13.57	86.43
Intra-district migrants	Urban to Rural	36.77	63.23	39.20	60.80
Intra-district migrants	Rural to Urban	46.87	53.13	33.76	66.24
Intra-district migrants	Urban to Urban	49.33	50.67	44.75	55.25
Inter-district migrants	Rural to Rural	34.67	65.33	17.15	82.85
Inter-district migrants	Urban to Rural	50.50	49.50	46.91	53.09
Inter-district migrants	Rural to Urban	52.36	47.64	33.39	66.61
Inter-district migrants	Urban to Urban	47.76	52.24	43.34	56.66
Inter-state migrants	Rural to Rural	38.91	61.09	28.14	71.86
Inter-state migrants	Urban to Rural	49.16	50.84	58.20	41.80
Inter-state migrants	Rural to Urban	52.53	47.47	42.77	57.23
Inter-state migrants	Urban to Urban	44.18	55.82	48.01	51.99

Source: Census of India, 2001

Table 14 shows the reasons for international and inter-state migration from Uttarakhand and India. In the case of international migration, 29.4% of total migrants from the state were due to work/employment. About 31% of migrants moved with the household and about 10 percent moved due to marriage. Further, 27.6 percent of international migration from the state was due to other reasons. As far as inter-state migration from the state is concerned, 30.4% of total migrants from the state moved with the household. Next to it was migration due to marriage which constituted 29% of total inter-state migrants. About 24 percent inter-state migration took place due to employment outside the state. Business and education had insignificant share in the total inter-state migration from Uttarakhand.

Table 14: Migrants identified by Reasons for Migration in Uttarakhand (U.K.) and India,

2001 (in %)

Place of last residence	Work employment		Business		Education		Marriage		Moved after birth		Moved with household		Others	
	UK	India	UK	India	UK	India	UK	India	UK	India	UK	India	UK	India
International migrants	29.4	8.8	0.4	1.1	1.8	0.8	9.8	12.3	0.2	0.6	30.8	39.9	27.6	36.4
Inter-state migrants	23.7	26.4	0.7	2.0	1.8	1.3	29.0	29.7	1.1	3.9	30.4	23.6	13.3	13.1

Source:Census of India, 2001

9. Condition of Slums

One of the major issues associated with urbanization is the growth of slums. As per the 2011 census, slums in Uttarakhand accounted for 89,398 households. Out of them, about 63% were reported to be in good condition. As far as source of drinking water is considered, 74% of total households had access to tap water for drinking. Next to tap is hand pump for which 23% households had access. All other sources together accounted for less than 4% of total households (Table 15). Further, out of 74,628 households which had sources of drinking water within their premises, 76% had tap water and 22% had hand pump. Table 15 shows that a majority of households had access to drinking water through tap and hand pump. However, about 17% of the total households living in slums did not have any source of drinking water within their premises.

Table 15: Access to water among slum households, Uttarakhand (2011)

Location of source of drinking water	Total Households	Tap	Well	Hand Pump	Tube-well	Others Sources
Total	89398 (100)	73.77	0.20	22.83	2.17	1.03
Within the premises	74628 (100)	75.67	0.15	21.82	2.36	0.0
Near the premises	10383 (100)	67.71	0.46	25.97	1.29	4.57
Away	4387 (100)	55.64	0.57	32.73	1.07	9.99

Source: Census of India, 2011

Other sources include spring, river, canal, pond, lake, etc.

As far as access to sanitation in slum households is concerned, as shown in Table 16 almost 92% has one or the other form of facility. About 28% of households had flush toilets connected to piped sewer system while about 53% of households had flush toilets connected to septic tank. Rest of the households had other types of facility, including pit and services toilets.

About 80% of the slum households have proper bathroom and drainage facilities (with or without enclosure and roof) while only about 30% households has underground drainage facility. Thus, access to sanitation was fairly high, however considerable improvement in drainage was required.

As shown in Table 16 about 94% of total households had electricity supply while about 5% used kerosene for lighting.

As regards cooking, it is noted that kitchen facility was available with only 75% of the slum households while the rest cooked in open. Interestingly with 67% households, LPG was the main source of cooking fuel followed by fire wood (22%), and kerosene (7%).

Table 16: Characteristics of Slums Households, Uttarakhand (2011)

BY MAIN SOURCE OF LIGHTING					
Electricity	Kerosene	Solar energy	Other oil	Any other	No lighting
83,847	4,461	165	90	413	422
(93.79)	(4.99)	(0.18)	(0.10)	(0.46)	(0.47)

BY AVAILABILITY OF TRAINING FACILITY											
No. of households having bathing facility within the premises	**Type of latrine facility within the premises**								No. of households not having latrine facility within the premises	No latrine within premises	
	Flush/pour flush latrine connected to			Pit latrine			Service Latrine				
	Piped sewer system	Septic tank	Other system	With slab/ventilated improved pit	Without slab/open pit	Night soil disposed into open drain	Night soil removed by human	Night soil serviced by animal		Public Latrine	open
81977	24742	47778	1719	5,873	567	1,080	166	52	7421	2000	5421
(91.70)	(27.68)	(53.44)	(1.92)	(6.57)	(0.63)	(1.21)	(0.19)	(0.06)	(8.30)	(2.2)	(6.1)

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BY BATHING FACILITY AND TYPE OF DRAINAGE CONNECTIVITY FOR WASTE WATER OUTLET					
No. of households having bathing facility within the premises			Waste water outlet connected to		
Yes					
Bathroom	Enclosure without roof	No	Closed drainage	Open drainage	No drainage
71334	8086	9978	26661	57555	5182
(79.79)	(9.04)	(11.16)	(29.82)	(64.38)	(5.80)

BY TYPE OF FUEL USED FOR COOKING											
Availability of separate kitchen	Total	Fire-wood	Crop residue	Cow dung cake	Coal/ Lignite / Charcoal	Kerosene	LPG/ PNG	Electricity	Biogas	Any other	No cooking
Total	89398	19737	953	1944	85	5872	60202	24	127	92	362
Cooking inside house	85815	17968	884	1510	64	5673	59497	23	107	89	-
Has Kitchen	64624	7919	560	561	38	2609	52799	11	84	43	-
Does not have kitchen	21191	10049	324	949	26	3064	6698	12	23	46	-
Cooking outside house	3221	1,769	69	434	21	199	705	1	20	3	-
Has Kitchen	1553	743	51	168	13	97	473	1	7	-	-
Does not have kitchen	1668	1026	18	266	8	102	232	-	13	3	-
No Cooking	362	-	-	-	-	-	-	-	-	-	362

Table 17 presents town-wise distribution of slum population along with number of workers living in slums in 2001. With 59% of total urban households living in slums Rudrapur ranks highest while Dehradun 20% ranks a distant second. In the hill towns the issue of slum is not as significant for obvious reasons. Interestingly Haridwar has very low fraction of slum households.

Table 17: Identified/Estimated Slum Population in Uttarakhand (2001)

Slums locations	No. of Households	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
Dehradun (M.Corp)	16863	91939	25872	22499	3373	66067
	(20.07%)	(21.55%)	(21.25%)	(20.28%)	(31.19%)	(21.67%)
Haldwani-cum-Kathgodam (MB)	1065	6344	1795	1741	54	4549
	(4.61%)	(4.92%)	(4.98%)	(5.16%)	(2.35%)	(4.89%)
Kashipur (MB)	2829	18192	4425	4089	336	13767
	(18.11%)	(19.57%)	(18.26%)	(18.46%)	(16.15%)	(20.03%)

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Slums	No. of	Total	Total	Main	Marginal	Non

locations	Households	Population	Workers	Workers	Workers	Workers
Rudrapur (MB)	9582	53477	15258	13457	1801	38219
	(59.04%)	(60.31%)	(58.83%)	(57.10%)	(76.06%)	(60.92%)
Roorkee (MB)	2827	18158	4566	4333	233	13592
	(16.05%)	(18.62%)	(17.95%)	(17.64%)	(26.51%)	(18.86%)
Hardwar (MB)	1263	7360	2063	1931	132	5297
	(3.93%)	(4.20%)	(4.28%)	(4.44%)	(2.76%)	(4.17%)
Total	**34429**	**195470**	**53979**	**48050**	**5929**	**141491**
	(18.24%)	**(19.35%)**	**(19.17%)**	**(18.59%)**	**(25.55%)**	**(19.42%)**

Note: Figures in Parentheses are percentages from population of cities/towns reporting slums

Source: census of India, 2001

10.0. Status of Industrialization in Uttarakhand

One of the main concerns of Uttarakhand after getting the status of a separate state was to accelerate the pace of economic development so that more income and employment opportunities could be created for its people. As agriculture would not be able to sustain livelihood of large number of people; the policy focus was oriented towards development of industries, services and construction activities. Efforts are being made to remove various development constraints, including those related to physical and economic infrastructure; connectivity; raw material availability; market access, and, education & skill. The Government of Uttarakhand announced its Industrial Policy 2003 which offer a large number of fiscal and financial/tax incentives to prospective investors for setting up industrial units. To facilitate the process it has also set up State Industrial Development Corporation of Uttaranchal (SIDCUL) in 2002 for industrial development and transferred around 6,200 acres of land free of cost. SIDCUL in turn has set up several industrial estates at Haridwar, Pantnagar, Sitarganj and other places. The industrial policy focuses on modernization/ expansion/revival of existing SSIs; IT Park and specialized industrial estates for biotechnology; accords industry status to tourism; public-private partnership for infrastructure development and development and maintenance of specialized estates.

Subsequently, the Government of Uttarakhand announced new integrated industrial development policy in 2008, with special focus on development in backward and remote hill districts. As a result of wide ranging incentives Uttarakhand has emerged as one of the fastest growing states of India and over the last decade the share of secondary sector in the NSDP has increased significantly (Figure 13). Fast growth of industries, especially in the plain also has several implications on land and water pollutions. According to Central Pollution Control Board, the state has 17 industries in highly polluted categories, such as Sugar, Pulp & Paper, Pesticides, Cement, Pharma, Distilleries, Iron & Steels, etc. Most of the polluting industrial units, such as sugar, pulp & paper, distilleries, are located at the bank of river Ganga or its tributaries releasing effluence into the river system. This report makes a detailed analysis of industrialization in the state.

10.1 Growth Trends in NSDP from Secondary and Tertiary Sectors

A comparison of average percentage shares of the primary, secondary and tertiary sectors in the NSDP for 1999-2000 and 2011-12 is presented in Figure 11. It is noted that by 2011-12 the share of secondary sector has registered a significant increase while that of the primary sector has declined. This indicates that during the last one decade, after formation of the separate state of Uttarakhand, there was impetus in the areas of industry/manufacturing, infrastructure, electricity & water supply and construction activities, etc. However, it is intriguing to note that the primary sector comprising agriculture has registered a concurrent significant decline.

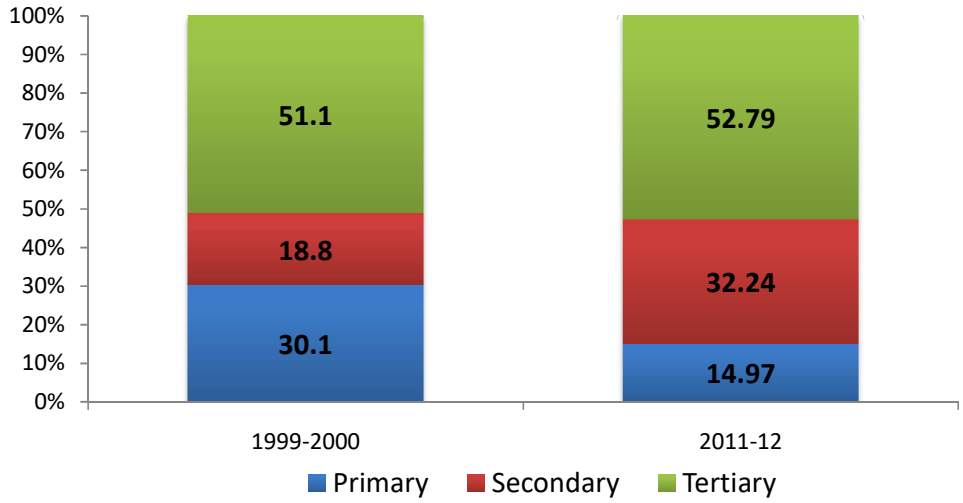


Figure 11: Sectoral Composition in NSDP, Uttarakhand

Source : CSO/Directorate of Economics & Statistics,Uttarakhand

Figure 12 shows growth trends in NSDP from manufacturing and tertiary sectors along with the growth in total NSDP of the State during 2004-05 to 2012-13. During this period, at an annual growth rate of 15.57% per annum Uttarakhand was deemed to be the fastest growing economy among all the states in India. This is attributed to significant investments in manufacturing/ industry as a result of host of incentives that were offered by the government of the newly created state. It is interesting to note that during this period the per capita income in the state increased by 12.54% per annum.

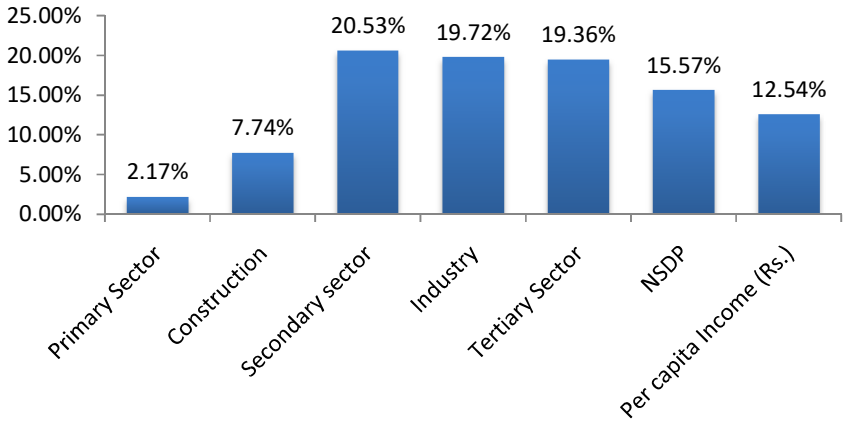


Figure 12: Annual Average Growth rate at constant prices (2004-05), 2004-05 to 2012-13, Uttarakhand

10.2:Trends in Number of Factories, FC, Employment, Output and NVA

The data related to investment in industrial sector, eployment generation, etc. in Uttarakhand is presented Table 18. It is noted that over the last decade the fixed capital has increased phenomenally by 2660% which led to impressive increase in other indicators of industrial production / outputs. For instance over the same period the number of factories in the state increased by almost 450%, the number of workers increased by 875%, the gross value of output went up phenomenally by over 3300% and the 'net value added' rose by over 5000%. Evidently the attractive policy framework laid out by the government of the newly created state has enabled this shift in industrial landscape and has led to overall groth in the sector. This has also made a significantly positive impact on the share of the state in the overall national scenario and has made it a strongly emerging industrial base in the country.

Table 18: Trends in capital, employment, output, and NVA in Industries (Factory Sector) in Uttarakhand

Items	1999-2000	2002-03	2004-05	2006-07	2008-09	2010-11	% change in decade
No. of Factories (No.)	616	715	752	1150	1907	2739	445%
	(0.47)	(0.56)	(0.55)	(0.79)	(1.23)	(1.29)	
Fixed Capital (Rs. Lakhs)	135860	204586	287679	949313	2189841	3614107	2660%
	(0.34)	(0.46)	(0.56)	(1.33)	(2.07)	(2.25)	
No. of Workers (No.)	26743	27815	35349	71115	172861	234079	875%
	(0.43)	(0.45)	(0.54)	(0.90)	(1.97)	(2.36)	
Total Persons Engaged (No.)	34336	41485	51762	95061	229727	288261	840%
	(0.42)	(0.52)	(0.61)	(0.92)	(2.03)	(2.27)	
Value (Gross) of Output (Rs. Lakhs)	314162	603559	1007348	2161728	8292360	10583763	3369%
	(0.35)	(0.53)	(0.60)	(0.90)	(2.53)	(2.26)	
Net Value Added (Rs.	51781	133457	194801	497901	2843285	2634767	5088%

Items	1999-2000	2002-03	2004-05	2006-07	2008-09	2010-11	% change in decade
Lakhs)	(0.33)	(0.77)	(0.75)	(1.26)	(5.39)	(3.74)	
Fixed Capital per Factory (Rs. Lakhs)	220.55	286.13	382.55	825.49	1148.32	1319.50	598%
Gross Output Per Factory (Rs. Lakhs)	510.00	844.14	1339.56	1879.76	4348.38	3864.10	758%
NVA per Factory (Rs. Lakhs)	84.06	186.65	259.04	432.96	1490.97	961.94	1144%
No. of Workers per Factory	43.41	38.90	47.01	61.84	90.65	85.46	197%

Note: Figures in parentheses are percentage share in India's total

% Change in the last column corresponds to the data for 1999-2000 and 2010-2011.

Source: Compiled from ASI data

10.3 District-wise Pattern of Industrialization in Uttarakhand

Table 19 presents district-wise distribution of number of registered units in the state which establishes a uneven pattern. In 2000-01, just before the new investment started flowing in the share of hills and plains was about the same. However, in the subsequent decade a bulk of investment has coming in the plains which is attributed to better connectivity and availability of raw materials, linkages to markets, etc. Haridwar, Dehradun and US Nagar have relatively achieved higher growth in the number of registered units when compared to other districts.

Table 19: District-wise Number of Registered Units in Uttarakhand

Districts	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Almora	---	---	---	---	---	---	6	7	7	7	7
Bageshwar	21	21	49	50	75	77	55	43	36	50	49
Chamoli	169	14	105	177	183	181	5	16	41	60	47
Champawat	14	16	24	36	48	62	74	52	35	110	60
Garhwal		241	245	250	280	295	200	128	124	155	170
Pithoragarh	44	44	42	116	195	147	126	68	62	71	58
Rudraprayag	60	60	65	65	84	83	91	45	46	50	43
T. Garhwal	---	235	210	215	237	251	253	115	88	103	112
Uttarakashi	159	123	155	155	181	181	192	57	53	62	55
Hills	**467**	**754**	**895**	**1064**	**1283**	**1277**	**1002**	**531**	**492**	**668**	**601**
Dehradun	247	219	224	172	244	278	354	202	216	299	290
Hardwar	169	157	369	372	399	409	497	238	241	394	234
Nainital	33	82	77	152	213	245	260	139	95	137	140
US Nagar	32	54	213	253	306	377	414	271	246	372	219
Plains	**481**	**512**	**883**	**949**	**1162**	**1309**	**1525**	**850**	**798**	**1202**	**883**
Uttarakhand	**948**	**1266**	**1778**	**2013**	**2445**	**2586**	**2527**	**1381**	**1290**	**1870**	**1484**

Source: Directorate of Industries, Government of Uttarakhand

A comparison of Table 19 and Table 20 shows that plain areas of the state account for relatively larger size industrial units compared to the hills. Industrial employment has grown much faster in plain areas than the hill areas. Consequently share of hill areas in the total industrial employment

has declined, and this is depicted in Figure 13. This pattern/trend is again attributed to improved connectivity in the plains.

Table 20 : District-wise Employment in Registered Units in Uttarakhand

	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Almora	--	--	--	--	--	331	627	641	614	--
Bageshwar	33	29	27	37	41	37	64	230	301	377
Chamoli	243	267	264	281	278	248	80	198	203	236
Champawat	33	51	69	82	127	154	107	66	157	165
Garhwal	513	509	545	544	630	538	298	384	901	581
Pithoragarh	77	86	233	377	303	214	202	165	245	345
Rudraprayag	126	109	187	174	198	-	108	143	125	185
T. garhwal	613	568	507	463	555	528	273	328	335	338
Uttarakashi	180	198	201	252	215	220	87	65	190	247
Hills	**1818**	**1817**	**2033**	**2210**	**2347**	**2270**	**1846**	**2220**	**3071**	**2474**
Dehradun	561	452	485	950	1421	2298	3811	3023	6013	3025
Hardwar	403	806	920	1077	1721	3383	6304	7181	7333	6928
Nainital	265	254	462	541	505	579	495	568	1291	675
US Nagar	--	--	20	40	279	1177	3239	4776	6244	5616
Plains	**1229**	**1512**	**1887**	**2608**	**3926**	**7437**	**13849**	**15548**	**20881**	**16244**
Uttarakhand	**3047**	**3329**	**3920**	**4818**	**6273**	**9707**	**15695**	**17768**	**23952**	**18718**

Source: Directorate of Industries, Government of Uttarakhand

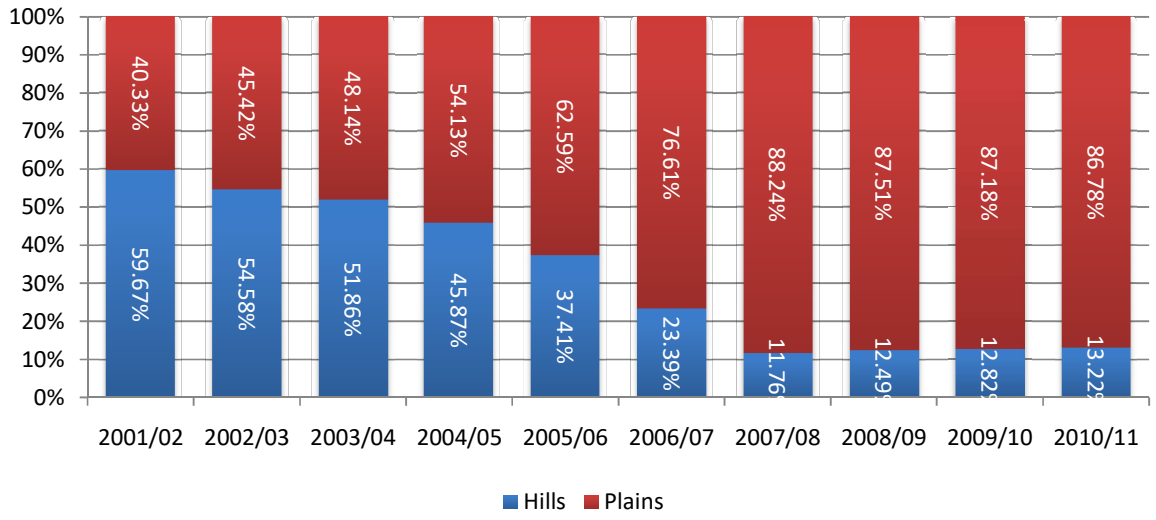


Figure 13: Proportion of Employment in Registered Industrial Units of Hills and Plain, Uttarakhand

District-wise trend in investment in the registered industrial units are shown in Table 21. As is apparent from the Table, level of industrial investment varies significantly across districts and years. In 2001-02, 9 hill districts together had Rs.581.43 lakhs investment in registered units. The amount of investment went up to Rs.4750.9 lakhs by 2010-11; whereas the corresponding figures in plain districts went up substantially from Rs.509.1 lakhs to Rs. 1,36,081.6 lakhs during the same

period. This shows that after the statehood, most of the industrial investment occurred in the plain districts, especially Haridwar, US Nagar and Dehradun. For instance, in Haridwar district, the amount of investment went up from only Rs.153 lakhs in 2001-02 to Rs.61703.4 lakhs in 2010-11.

Table 21: District-wise trend in Investment in Registered Units in Uttarakhand (in Lakhs)

	Up to									
District	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Almora	--	--	--	--	--	--	--	--	--	--
Bageshwar	29.38	24.96	26.4	37.43	41.85	42	105.9	46.7	289.08	192.48
Chamoli	77.66	113.04	93.14	87.43	153.34	133.8	80.94	785.42	361.44	737.48
Champawat	15.15	18.58	30.7	33.69	54	110.63	72.39	158.41	235.08	219
Garhwal	140.82	188.12	657.53	685.11	347.19	405.9	273.54	607.53	5919.96	1050.47
Pithoragarh	49.48	22.05	73.64	126.93	161.12	139.64	239.59	170.82	268.59	546
RudraPrayag	46.18	48.05	57.82	68.33	78.75	--	77.04	341.49	197.81	300.87
T. Garhwal	152.04	236.05	141.1	155.94	287.84	165.53	136.72	1394.67	1354.16	1168.68
Uttarkashi	70.72	69.99	73.96	84.46	89.96	101.2	85.55	364.5	248.79	535.91
Hills	**581**	**721**	**1154**	**1279**	**1214**	**1099**	**1072**	**3870**	**8875**	**4751**
Dehradun	179.83	72.4	249.42	661.02	976.7	2935.65	8795.37	8771.13	14185	15141.1
Hardwar	153	350	693	1983	2940.7	19332.8	43582.1	53927.8	55093.4	61703.4
Nainital	176.27	233.99	282.2	276.25	241.12	403.24	1315.45	2301.67	5390.25	3261.31
US Nagar	--	--	37	306	1336	6869	25359	55447	69617	55976
Plains	**509**	**656**	**1262**	**3226**	**5495**	**29541**	**79052**	**120448**	**144286**	**136082**
Uttarakhand	**1091**	**1377**	**2416**	**4506**	**6709**	**30639**	**80124**	**124317**	**153161**	**140833**

Source: Directorate of Industries, Government of Uttarakhand

Plain area of the state witnessed rapid industrialization after the statehood. As a result, share of districts located in the plain areas in the total investment in the registered industrial units has substantially increased during the last 10 years. Figure 14 demonstrates that the share of hill districts in the total investment has drastically declined from 53.3% in 2001-02 to 3.4% in 2010-11; while the corresponding share of plain areas has gone up from 46.7% to 96.6% during the same period. Evidently for the hilly regions of the state which are characterized by difficult topography, climatic conditions, poor connectivity and lack availability of raw material and manpower, it is understandable that the new industrial policy with focus on conventional form of industrialisation may not help in bringing about even distribution of benefits of across the two distinct regions. Evidently for the hill regions to progress on the lines of sustainable development, there is need to identify appropriate factors which are in synergy with the local ecology and other boundary conditions outlined above.

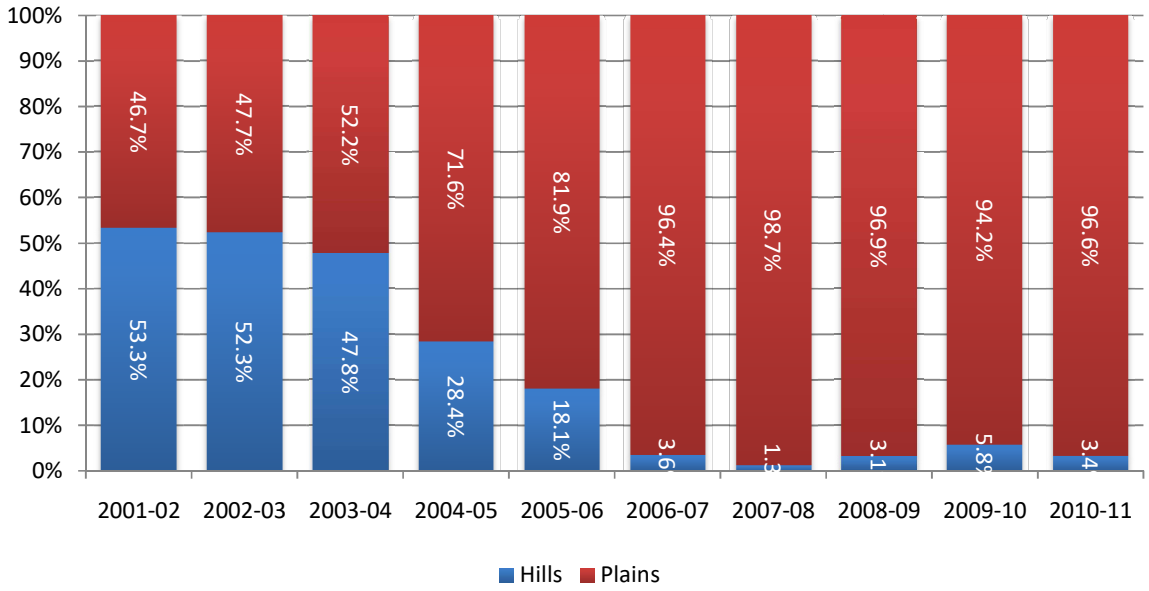


Figure 14: Proportion of Investment in Registered Industrial Units of Hills and Plain, Uttarakhand

11.0. Sources of Pollution in the River Ganga

Urbanization, industrialization and chemicalization of agriculture are the key factors of river pollution which lead to creation of classified large number of point and non-point sources. Point sources include discharges of domestic sewage from urban areas and trade effluents from industries , while non-point sources comprise, among others, run off from agriculture fields laden with pesticides and chemical fertilizers. Heavy doses of pesticides and chemical fertilizers used in agriculture in the plain areas of the state not only pollute the groundwater but also pollute the river through run-off. Moreover, while the cities in the state have small resident population, they are characterized by large floating population during the season of pilgrimage in summers and which, for want of adequate infrastructure lead to discharge of large quantity of sewage and solid waste into the river and the environment respectively.

11.1 Urban Sewage

Most of the towns are located on the banks of Ganga or her tributaries, famous for major destinations of pilgrims or religious tourism. Discharge of raw or mixed sewage into the river makes matters worse because pilgrims take holy dip in these rivers. Unplanned development, together with rapid urban growth and the inflow of tourists and pilgrims has made critical impacts on the urban environment of Uttarakhand. Most of the towns have grown in an unplanned manner causing immense pressure on the urban infrastructure and services resulting in degradation of the urban environment. However, except for a few towns, in most of the cases, sewerage collection system and sewage treatment plants have not yet been installed. Even in those towns where sewage treatment facilities are available, the facilities are inadequate and ill-equipped in treating the ever increasing volume of wastewater. According to Indiastat.com, in

2008, Class-I cities of Uttarakhand generated 177 MLD sewage, while treatment capacity was only 18 MLD. Table 22 presents the details of sewage generated in some Class-I and Class-II cities and the available treatment capacity of STPs.

Table 22: Waste water Generation and Treatment in Uttar Pradesh

S. No.	City/Town	Population 2001	Total Sewage generation (in MLD)	Treatment Capacity (in MLD)	Percentage covered
Class I					
1	Dehradun	550800	76.1	-	0
2	Hardwar	215260	39.6	18	45
Class II					
1	Rishikesh	59671	10.7	6.3	59
2	Roorkee	97064	11	-	0

Source: TERI (2011)

11.2. Industrial Effluents

The fragile ecological nature of the state leaves it particularly vulnerable to the negative environmental impacts of large-scale industrialization. There is limited data on the extent of environmental damage caused by industrial pollution. There are various types of polluting industries located in the state such as aluminium, copper, fertiliser, pesticide, pulp & paper, distillery, sugar, iron & steel, petrochem, refinery, zinc, cement, dyes & dyestuffs, leather, and pharma, etc. As of August 2012, there were 49 industrial units in Uttarakhand which were classified under highly polluted categories as per the Central Pollution Control Board criteria. Out of them it was found that only 27 industries are complying with the discharge/ emission norms and 19 units did not comply while 3 have been closed down for various reasons (Indiastat.com).

12.0. Summary and Actionable Points

The findings of the study are summarized in the following paragraphs.

12.1 Urbanization

1. During the last two decades, Uttarakhand and witnessed relatively rapid urbanization. Despite a large geographical area characterized as difficult hilly terrain, the overall level of urbanization in the state is almost comparable to the national average.

2. However, urbanization in the state is primarily confined to the four districts in the plains, namely, Haridwar, US Nagar, Dehradun and Nainital, which together constituted about 85% of the urban population of the state.

3. While the urban centres are characterized by limited municipal infrastructureto deal with the rising urban population, the hill regions are also facing serious problems due to the rising loads of tourists and pilgrims in summer seasons.

4. While there has been a significant improvement in access to sanitation in urban areas, there is a large unmet demand in rural areas across the state. The deficit in several districts ranges from 40-60%.

5. Over the years ULBs in the hills and the plains alike have made investments in improving drainage system for collection of sewage, sullage and storm water. However, there are issues with the type of sanitation solutions, sustainability, operation and maintenance and lack of treatment facilities.

6. Household expenditure in rural areas has recorded higher increase compared to the urban areas which indicates a certain degree of fall in disparity between rural and urban areas, however this may be only in the short-term and may not represent a statewide long-term trend. Data also reveal falling share of expenditure on food items in both rural and urban areas - the latter accounting a faster rate.

7. Despite rapid economic growth in the state during the last decade, quality of employment appears to have deteriorated .

8. A majority of people of the state migrate to other states in search of better employment opportunities.

9. As per the 2011 census there are close to 90,000 households residing in slum settlements in the urban centres in the state. Typical of such settlements, they are characterized by significant deficit in water and sanitation infrastructure and services.

12.2 Industrialization

10. Uttarakhand has emerged as one of the fastest growing states of India in the last decade, especially driven by growth of the secondary sector – manufacturing and construction activities.

11. During 2004-05 to 2012-13 the real NSDP in the state grew by a remarkable rate of 15.57% per annum (at 2004-05 prices) and per capita income increased by 12.54% per annum.
12. As a result of attractive policy framework, during the last decade the state has been able to record impressive gains in industrial investments, number of factories, industrial outputs, and the net value added. The share of the state in the overall national industrial landscape has made significant improvement.

13. As expected, industrialisation is concentrated in the plains region of the state and the share of hill districts in the total investment has drastically declined. Industrial units located in plain areas of the state are relatively bigger in size when compared to those located in the hill areas. Industrial employment has grown much faster in plain than the hill areas.

12.3 Actionable Points

While This report does not intend to offer a comprehensive set of recommendations, however, a set of issues which need to be addressed on priority are listed below.

- In view of the rising urban population and the phenomenal pressure of floating population in several urban and rural areas alike, there is a major need to strengthen the municipal infrastructure for water supply sewerage, sanitation and solid waste management.

- As regards wastewater, sanitation and solid waste management, there is an urgent need to identify and evolve a set of radical paradigms and robust solutions which respond to the difficult boundary conditions in the hilly areas. The usual approaches and solutions which are adopted in the plain areas do not offer sustainable and effective solutions for the hilly areas.

- There also a need to put in place appropriate institutional framework and incentive mechanism to address pollution from hotels and restaurants, the large number of tourists, etc.

- After the statehood, the share of secondary sector in the GSDP has significantly increased, which has critical implication for degradation of river water due to industrial effluents and stone and sand mining. Development strategy of the state needs to be shifted towards encouraging more knowledge intensive services and sustainable farming.

- As it becomes abundantly clear from the floods during 2013, most part of the state has very limited carrying capacity and therefore there is an urgent need for the state government to evolve and embrace a paradigm of sustainable development rather than copy the conventional paradigm of rapid economic development. The state needs to recognize the need to regulate the flood of tourists and pilgrims and evolve appropriate regulatory mechanisms.

- In order to ensure even economic development and distribution of benefits, there is a need to make appropriate policy interventions for the hill region on the lines of appropriate technologies and sustainable development and by taking into account the fragile ecology.

- Training and capacity building programmes should be initiated for urban local bodies so that these institutions may effectively perform their entrusted functions, including water, sanitation and waste disposal related works.

- Due to various push and full factors, out-migration from the hill areas has been increasing at a faster rate, leading to a further concentration of population in urban centres. As urbanization and industrialization are highly inter-related issues, a high level of urbanization in the plain areas of the state co-exists with a high concentration of industries, thereby generating a high level of pollution, including sewage and industrial wastes. This suggests that for maintaining the wholesomeness of River Ganga, emphasis should be more on four districts of plain/semi plain areas. However, town planning is to be made not only keeping in view resident population, but also the floating population which is quite high in some towns of religious and tourist importance.

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Status of Urbanization and Industrialization

in Middle Ganga Basin (Uttar Pradesh)

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology

IIT Bombay | IIT Delhi | IIT Guwahati | IIT Kanpur | IIT Kharagpur | IIT Madras | IIT Roorkee

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Framework for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialogue in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. A list of persons who have contributed directly and names of those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction

This report presents the trends in urbanization and industrialization in the Ganga River basin and analyzes their implications for the GRBMP, as most of the cities, towns and industrial units in the basin are located at the bank of Ganga, its offshoot canals and its tributaries. These urban centres and industrial units not only draw water from rivers for their various needs but also release untreated sewage and industrial effluents into them, adversely affecting both quantity as well as quality of water flow in the rivers. It may be further pointed out that even the sewage of cities and waste water of industrial units, located far away from the river bank, also directly or indirectly goes to the river through drainage system and heavily pollutes them. The accelerated pace of growth of urbanization and industrialization, especially during the last two decades of economic reforms in India, has put enormous pressure on the carrying capacity of the river system.

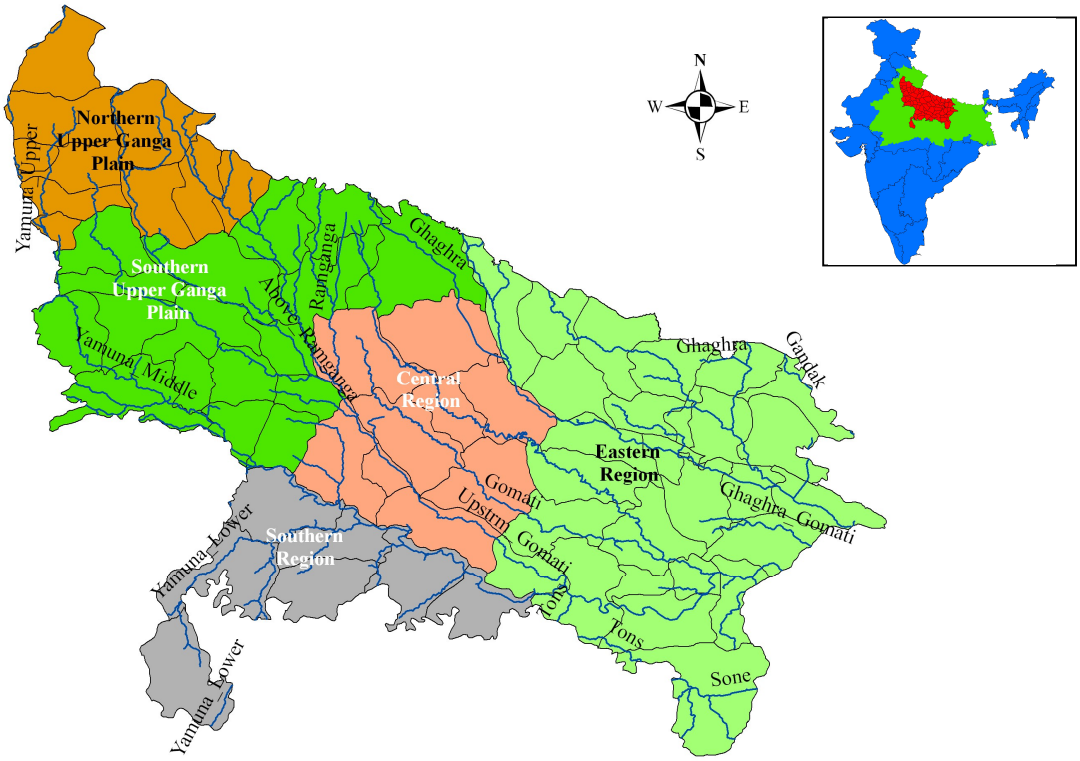
Since, urbanization, industrialization and the water pollution are inter-related issues; they are required to be addressed in an integrated manner. There are several anthropogenic and socio-economic factors associated with the growth of urbanization and industrialization that affect the quantity and quality of water resources. For example, growth and composition of GDP, household consumption expenditure, pattern of industrialization, and production and consumption practices, occupational structure, rural-urban migration, and other socio-demographic outcomes are some of the important indicators of water demand as well as its degradation. Therefore, in order to prepare a holistic GRBMP, it is important to understand the trends and pattern of urbanization and industrialization along with the associated factors. Keeping these aspects in view, this report concentrates on the pattern of urbanization and industrialization in the Ganga basin area and its implications for the river basin management. For the study purpose, the entire Basin is divided into three stretches, namely Upper Ganga Basin (Uttarakhand), Middle Ganga Basin (Uttar Pradesh) and Lower Ganga Basin (Bihar and West Bengal). This report exclusively focuses on the Middle Gang Basis comprising the Uttar Pradesh stretch.

2. Methodology

The present report is based on the secondary data drawn from various published sources, which includes Uttar Pradesh Govt. website (http://www.up.gov.in), Statistical Diaries, and Abstracts published by the State Planning Institute Lucknow, Uttar Pradesh, NSSO reports, and Annual Survey of Industries (ASI). Census of India has also been the important source for the population related data. For some indicators of urbanization and industrialization, data from Department of the Economics and Statistics, Ministry of Statistics and Programme Implementation (MOSPI) have been taken.

In this report, analysis of data is done at three levels—districts, regions and State. For analyzing various indicators, time series district-wise data have been used. The report accounts only for the 71 districts of Uttar Pradesh, as the statistics for the five newly formed

additional districts were rare to obtain. However, these 71 districts encompass the entire state including even the newly carved out five districts. In order to make the report more relevant, concise and brief, all the 71 districts have been divided into five regions and then detailed region-wise analysis has been carried out in order to draw meaningful inferences from the planning point of view. These five regions are: Northern Upper Ganga Plains (10 districts), Southern Upper Ganga Plains (18 districts), Central Region (9 districts), Southern Region (7 districts of Bundelkhand region), and the Eastern Region (27 districts). Map-1 depicts the location of Uttar Pradesh in the Ganga Basin, and all five regions discussed above.



Map 1: Location of Uttar Pradesh (with regions) in the Ganga Basin and in India

3. A Brief Profile of the Middle Ganga Basin (Uttar Pradesh)

Having a population of around 200 million people (as per 2011 Census), the Middle Ganga Basin comprising whole State of Uttar Pradesh, is one of the most populous regions of India. Uttar Pradesh, with an area of 236,286 sq. kms, covers a large part of the highly fertile and densely populated upper and middle Gangatic plains. It shares an international border with Nepal to the north along with the Indian state of Uttarakhand, Himachal Pradesh to the north-west, Haryana, Delhi and Rajasthan on the west, Madhya Pradesh on the south, Chhattisgarh and Jharkhand on the south east and Bihar on the east. Uttar Pradesh has more than 31 rivers. Among them, holy Ganga, Yamuna, Sarayu and Ghaghara are of very much religious importance. According to Census 2011, there are 7 cities in the State having population more than 1 million, while the number of cities having population more than 5

lakhs stand at 16. Total number of cities and towns has increased from 704 in 2001 to 915 in 2011. Total urban population has increased from 34.54 million in 2001 to 44.47 million in 2011, which corresponds to compounded growth rate of 2.56 percent per annum. However, in terms of urbanization the State's rank (excluding UTs) has gone down from 18 in 2001to 23 in 2011. This implies that the pace of urbanization in Uttar Pradesh has been relatively far slower than some of the other states such as Tamil Nadu, Maharashtra, Gujarat, etc.

4. Urbanization: Growth and Dimension

4.1 Urbanization in Uttar Pradesh

Trend in urbanization in the State has been compared with that of all-India. Figure-1 shows that the percentage of urbanization in Uttar Pradesh has been much lower than the national average. At the all-India level, rate of urbanization (% of urban population to the total population) has increased from 20 in 1971 to 28 in 2001 and further to 31 in 2011, whereas the corresponding rate of urbanization in Uttar Pradesh has increased from 14 in 1971 to 21 in 2001 and further to 22 in 2011. A perusal of Figure 1 reveals that the rate of urbanization of India as a whole has been much higher than that of Uttar Pradesh.

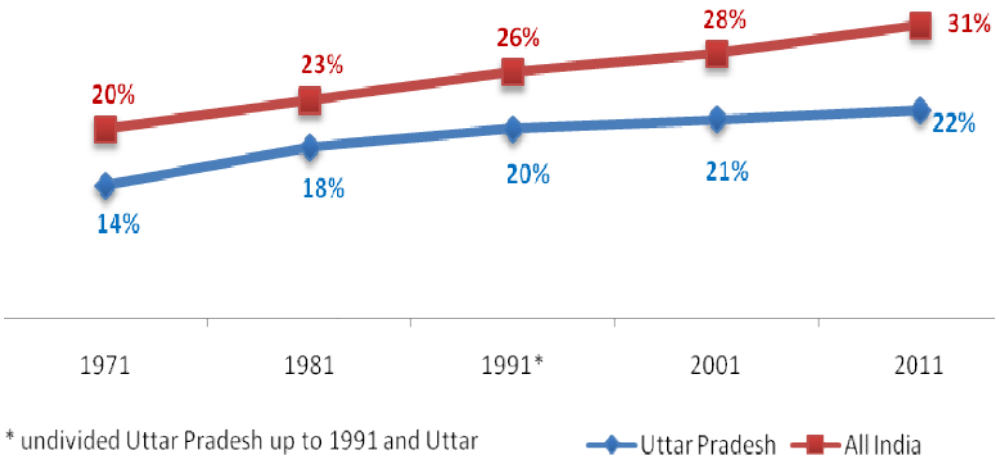
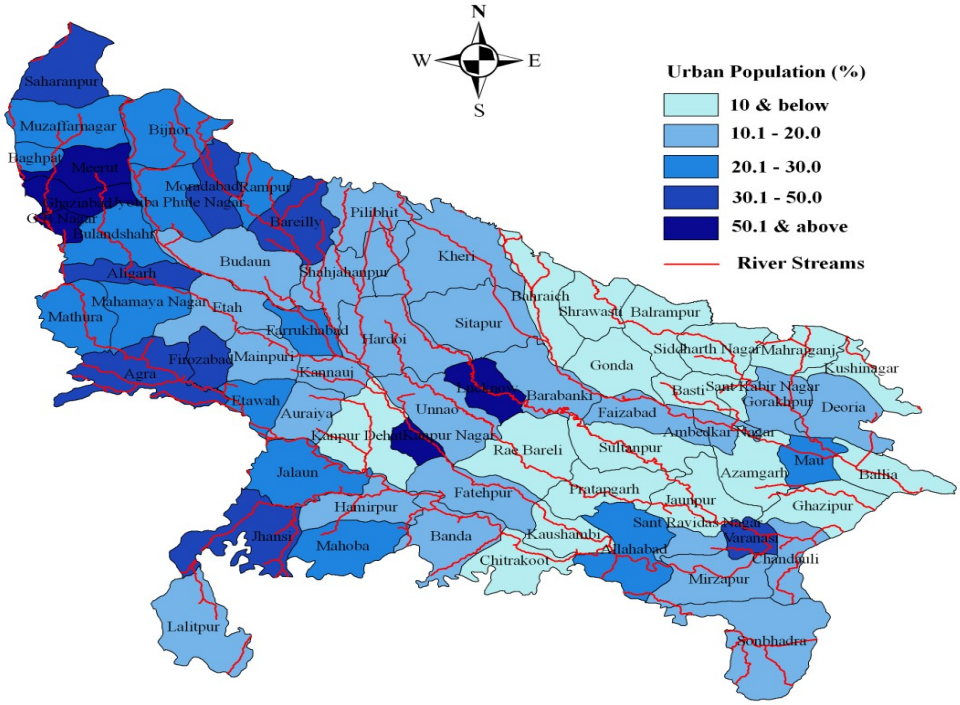


Figure 1: Level of Urbanisation (%), All India and Uttar Pradesh

As per the Census 2011, Tamil Nadu has 48.45 percent of its population as urban, followed by Kerala (47.72%), Maharashtra (45.23%), Gujarat (42.58%), Karnataka (38.57%) and Punjab (37.49%). Major states, where level of urbanization is below the national average comprise Madhya Pradesh, Rajasthan, Jharkhand, Chhattisgarh, Uttar Pradesh, Uttarakhand, Orissa, Assam and Bihar. Bihar has only 11.3 percent of total population in urban areas, ensued by Assam (14.08%), and Orissa (16.68%). Since, urbanization is one of the indicators

of development; the low rate of urbanization in Uttar Pradesh suggests that the State is far behind other states in terms of economic development.

The State of Uttar Pradesh not only has low level of urbanization, but is also characterized by wide variation in the level of urbanization across districts and regions. Map2 shows the district-wise level of urbanization in the State. As could be discerned from Map 2, there are two distinct groups: towards the east of Lucknow, there is a lighter shade compared to its west implying a better urban concentration in the west as compared to the east. Looking at the urban geographical concentration, we find that five districts viz., Lucknow, Kanpur Nagar, Meerut, Ghaziabad and Gautam Budha Nagar conspicuously appear on the map with more than half of their population as urbanized. There are eight districts with urban population ranging between 30.1 to 50 percent, out of which three are located in the Northern Upper Ganga Plain region (Saharanpur, Moradabad and Bareilly), three in the Southern Upper Ganga Plain region (Agra, Firozabad and Aligarh), one each in the Southern region (Jhansi) and the Eastern region (Varanasi). Fifteen districts had urban population in the range of 20.1 to 30 percent, 24 districts had in the range of 10.1 to 20 percent, and 19 districts had 10 or less than 10 percent urban population.



Map 2: Level of Urbanisation (%) across Districts of Uttar Pradesh, 2011

Relatively higher level of urbanization in the districts like Meerut, Ghaziabad, Gautam Budh Nagar, Aligarh, Agra, Kanpur, Allahabad, and Varanasi have greater implications for the quality and quantity of water flows in the River Ganga and its tributaries, as almost all of them are located at the banks of Ganga or its major tributary i.e., Yamuna.

4.2 Trends and Pace of Urbanization in Uttar Pradesh

Figure-2 demonstrates the category-wise increase in the number of towns in Uttar Pradesh and India between 2001 and 2011. Towns are classified into two categories—statutory towns and census towns. In Uttar Pradesh, number of statutory towns has increased from 638 in 2001 to 648 in 2011, while during the same period the number of census towns has increased 4 fold from 66 to 267. At all India level, number of census towns has increased from 1362 to 3894 during the last one decade, registering a less than 3 fold increase. This implies that the growth of census towns in Uttar Pradesh has been much higher than that across the country. However, at the aggregate level, percentage increase in the number of total towns has been higher in India (53.70%) than in Uttar Pradesh (30.0%).

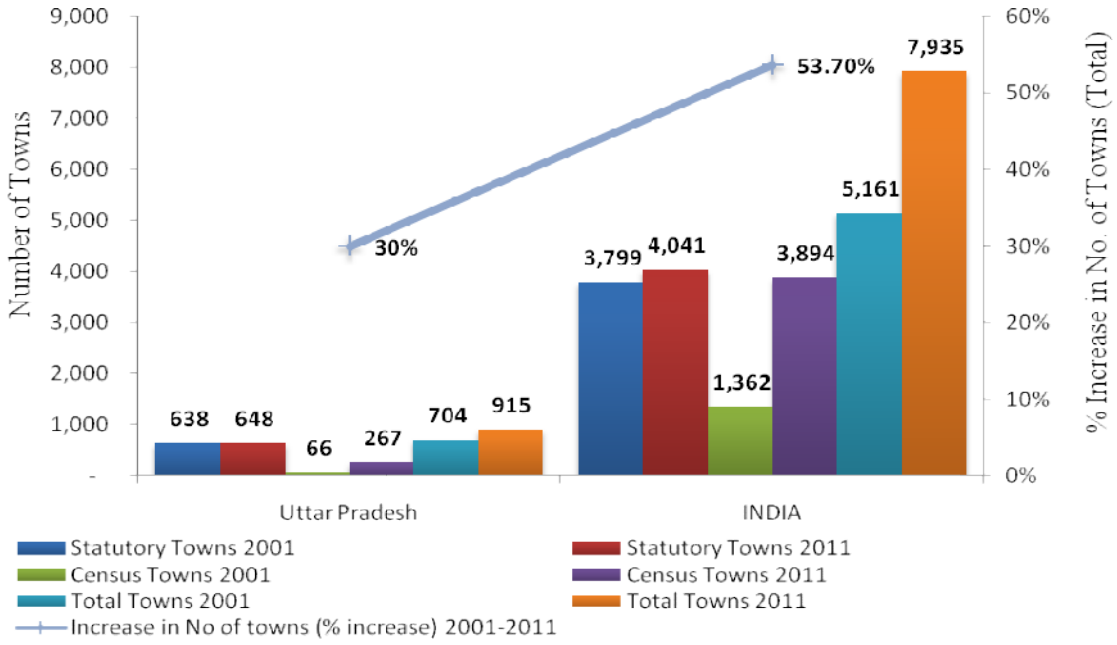


Figure 2: Increase in Number of Towns from 2001 to 2011, Uttar Pradesh and India.

Trends in urbanization in the state, as shown in Figure-3, suggests that the number of towns in the state has increased from 349 in 1901 to 410 in 1951, to 670 in 2001 and further to 915 in 2011. As far as trend in urban population is concerned, it is observed that it has increased from 123.89 lakhs in 1970-71 to 324.4 lakhs in 2001 and further to 444.70 lakhs in 2011. Trends in decadal growth rates in the urban population show that these rates vary significantly across decades. Since 1921, the urban population grew steadily till 1941 and thereafter, the urban population increased at a decreasing rate till 1961. After 1961, there has been significant growth in the pace of urbanization in the state. The decadal growth in urbanization was observed highest in the decade of 1971-81. During the last three censuses (1991, 2001, 2011), growth rates of urbanization are estimated to be 30.53%, 32.99% and 28.75% respectively. The information given in the Figure 3 clearly reveals that the decadal

growth rates in the urban population have been much higher than the growth rates in the rural population. There seems to be two factors explaining this growth - first is the increase in number of towns and the second is migration of rural population to the urban area. Over a period of time, some big villages have transformed into small towns. Moreover, the expansion of cities and towns also encircled the villages in their jurisdiction and thus, raised the urban population. The issues related to rural to urban migration has been discussed in a separate section.

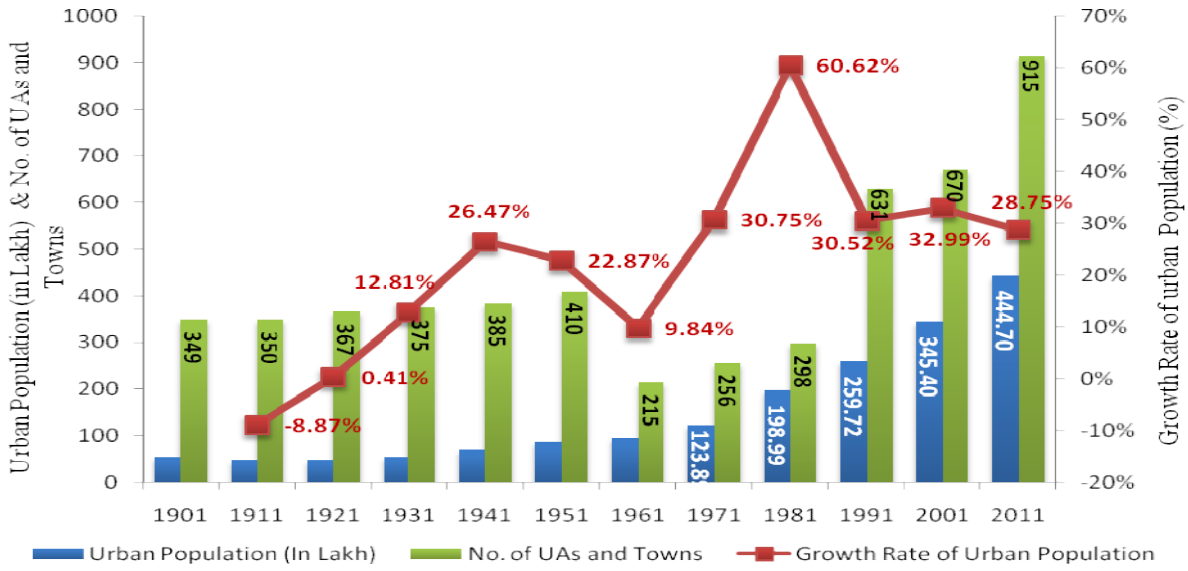


Figure 3: Urban Population (in Lakh) and Growth Rate, Number of UAs and Towns in Uttar Pradesh (1901-2011)

4.3 Regional Pattern of Urbanization

For the purpose of studying the trends and pattern of urbanization and its implications for the GRBEMP, the entire state is divided into 5 regions, as defined earlier. Since urbanization and industrialization are inter-related, a high level of urbanization in any region may also have a high concentration of industries and services, thereby leading to a high level of pollution content, including sewage and industrial wastewater released into the rivers. Figure 4 shows the regional trends in urbanization in the State. It is noteworthy that Northern Upper Ganga Plain (NUGP) has the highest percentage of urbanization in the state. It is followed by the Southern Upper Ganga Plain (SUGP) and the Central region (CR). The rate of urbanization in the Eastern Region (ER) is lowest among all the regions. It may also be relevant to note that the Upper Ganga Plains (northern plus southern) have more or less the same area and total population as the ER of the state has, however, the level of urbanization in the ER is about one-third that of the NUGP which implies that the policy

focus of pollution reduction in the Ganga river must be more on the Upper Ganga Plains and the Central Region.

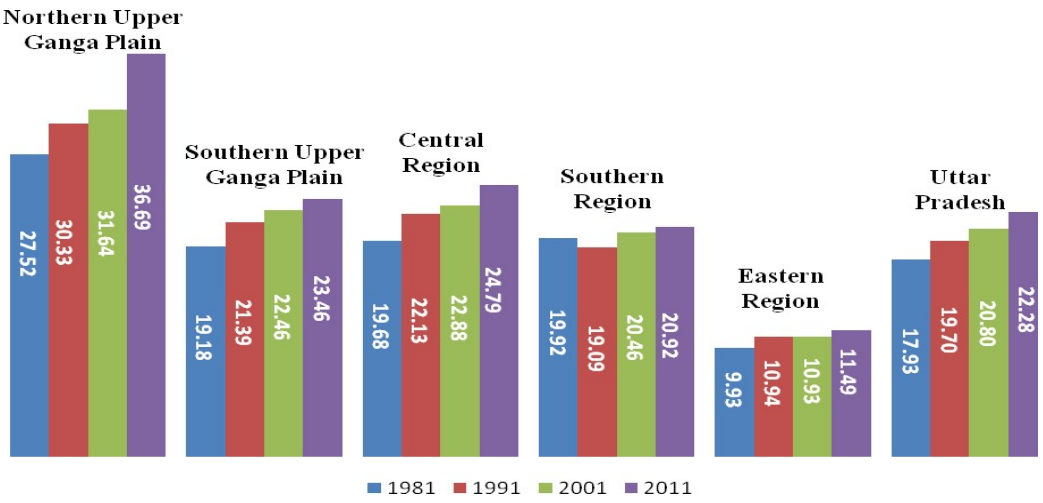


Figure 4: Urban Population (%) across Regions of Uttar Pradesh

As far as the regional trends in urbanization are concerned, as shown in Figure 4 in NUGP it has increased from 27.52% in 1981 to 36.69% in 2011, while the corresponding increase in the ER has merely been from 9.93% to 11.49%. At the State level, urbanization has increased from 17.93% in 1981 to 22.28% in 2011. It is also observed that the level of urbanization in the three regions, namely, NUGP, SUGP and CR was much higher than the State average.

Figure 5 displays the regional distribution of total population with rural-urban break-up in 2011. It is significant to note that although the NUGP constituted 15.7 percent of total population of the State, its share in the State's total urban population is 26.9 percent, while it shares only 12.5 percent of total rural population. Contrary to this, ER with 40 percent of total population of the State constitutes only 21.9 percent of total urban population. Three regions, namely, NUGP, SUGP and CR together constitute 55.2 percent of total population of the State, while they share 73.2 percent of total urban population of the State. This clearly indicates that Upper Ganga Plains and CR are more urbanized as compared to the other regions of the State. This fact is also evident from the region-wise percentage of urban population in 2011, as shown in Figure 5.

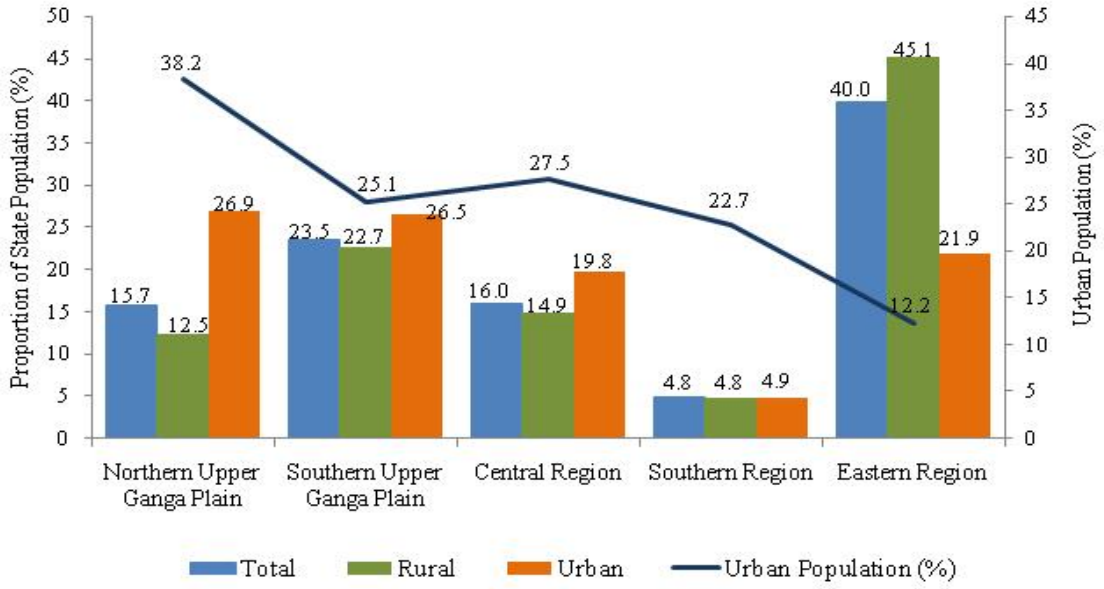


Figure 5: Proportion of State Population (%) and level of Urbanization across Regions of Uttar Pradesh, 2011

4.4 Growth Trends in Metro Cities

Figure 6 presents trends in population of seven Metropolitan Urban Agglomerations and Cities of the State since 1951. It is obvious from the Figure that there has been exponential growth in the population of these major cities. The highest increase is observed in Ghaziabad city, especially after 1991 as its population went up from 5.12 lakhs in 1991to 23.59 lakhs in 2011, registering a 4.6 fold rise. Similarly, population of Lucknow city went up from 16.69 lakhs in 1991 to 29.01 lakhs in 2011 (1.74 times increase). Population of Kanpur City, which is the largest city of the State, grew relatively at a slower pace during the last three decades as its population increased from 20.30 lakhs to 29.20 lakhs during the same period. At present, the population of capital city Lucknow is closer to that of Kanpur City. Population of Agra City increased from 9.48 lakhs in 1991 to 17.46 lakhs in 2011 (1.84 times increase). A perusal of Figure 6 reveals that during the last three decades, Ghaziabad recorded the highest increase, which is followed by Agra, Lucknow, and Meerut. Varanasi recorded the lowest increase, closely followed by Kanpur and Allahabad.

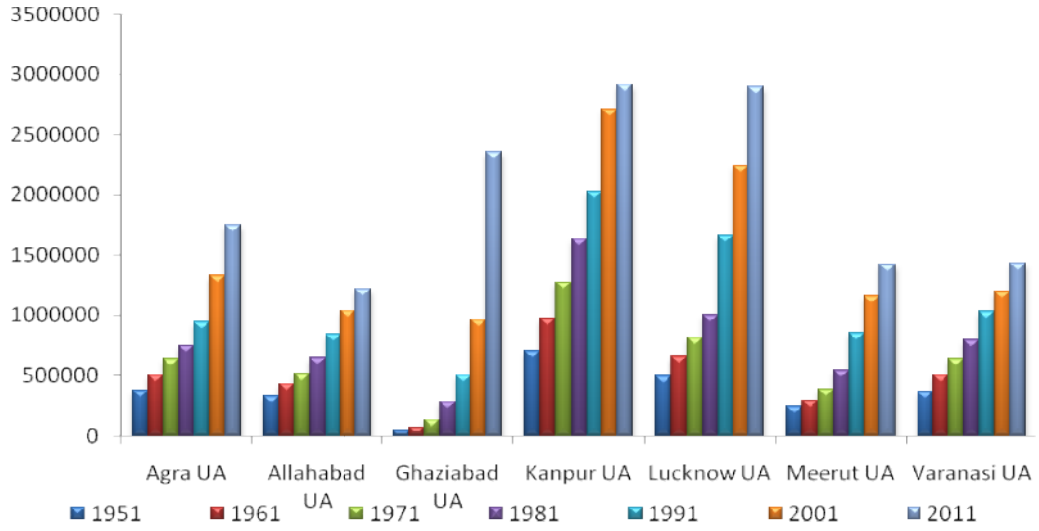


Figure 6: Population Trends in Metropolitan Urban Agglomerations and Cities in U. P. (1951-2011)

Figure-7 shows the decadal growth in population of these cities. As is evident from the Figure, Ghaziabad achieved the highest decadal growth during all the period. During 2001-11, its population growth was 143.58 percent while all the remaining cities are far behind. Next to Ghaziabad is Agra which recorded 31.18 percent growth during 2001-11. Agra is followed by Lucknow (29.21%) and Meerut (22.66%). Kanpur recorded the lowest growth (7.53%), distantly followed by Allahabad (16.74%). From the analysis of Figure 6 and 7, we can conclude that the cities located in the Upper Ganga Plains grew faster than the cities of other regions.

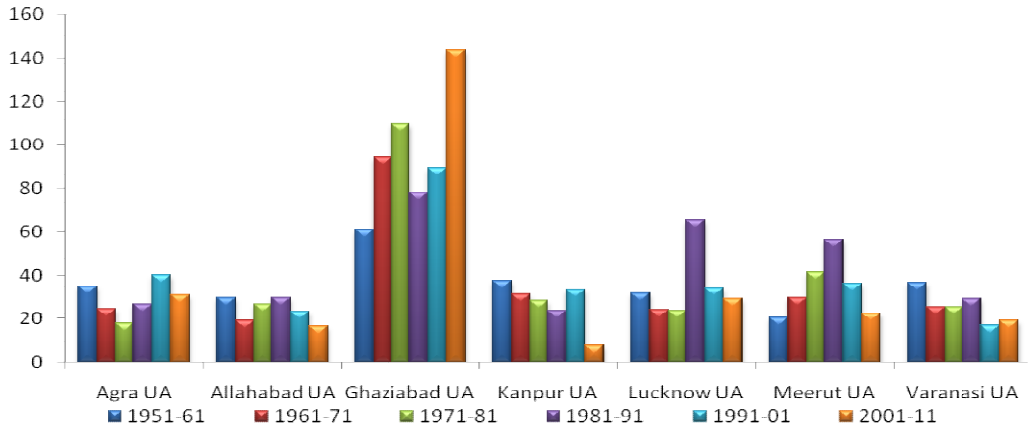


Figure 7: Decadal Variations in population of Metropolitan Urban Agglomerations and Cities in U.P.

4.5 Category-wise Growth of Cities and Towns

For this analysis, as shown in Figure 8 cities and towns are classified into six categories. It is noted that there has been significant growth in the Class-I cities in the State. The growth was highest in 1971 (57.66%) and lowest in 1901. Since 1931, there has been steady rise in the population growth of Class-I cities. The population growth rates in other categories of towns were also positive, but they show rise and falls across census years. In case of Class-II towns, the growth rate is found lowest in 1951 (9.04%) and highest (15.34%) in 1921. For Class-III towns, the growth rate ranged between 10.68% in 1921 and 16.87% in 1971. It is evident from the Figure 8 that since 1921, the population growth rates in Class-VI towns show a continuous decline. Thus, the population of Class-I cities has grown much faster than that in the other categories of towns.[1]

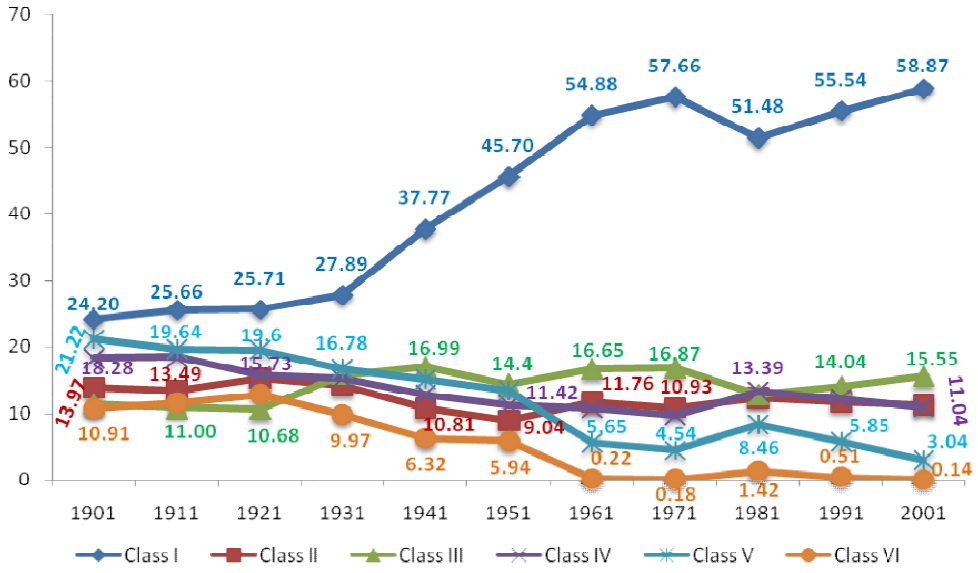


Figure 8: Class-wise Growth of Urban Population (%) in Uttar Pradesh

Regional pattern of growth of towns in the State is exhibited in Figure 9. The Figure is based on the 1991 and 2001 censuses. It is significant to note that during 1991-2001, number of towns in all the regions has increased. The number of towns in NUGP, SUGP, CR, SR (Bundelkhand) and ER during 1991-2001 has increased by 6, 12, 3, 6 and 23, respectively. During 2001, the highest number of towns is found in SUGP, followed by ER and NUGP. The Upper Ganga Plains, which constitute 39.2% of total population and 53.4% of total urban population of the State, have the largest number of towns (344 towns) in the State.

[1] The Census 2011 classification of urban settlements comprises metropolitan, or million plus cities;Class-I towns with population ranging from 1 lakh to 10 lakhs; Class-II towns with population ranging from 50,000 to 1 lakh;Class-III towns having population in the range of 20,000 to50,000; Class-IV towns from 10,000 to 20,000; Class-V towns with population from 5,000 to 10,000; and Class-VI towns from 3,000 to 5,000.

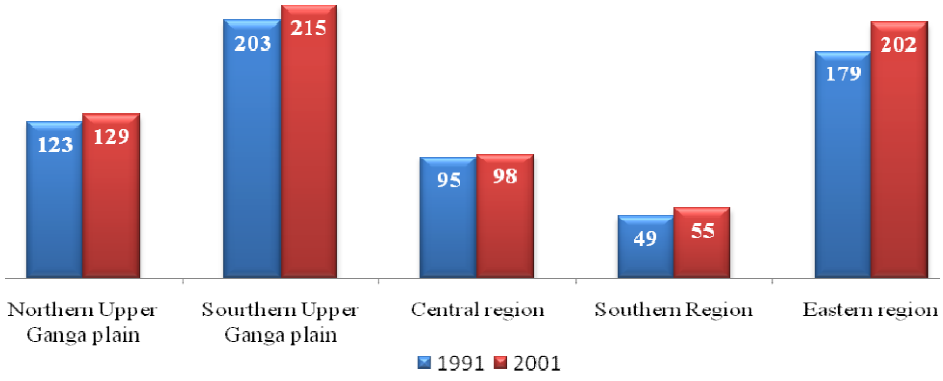


Figure 9: Number of towns across different Regions of Uttar Pradesh

As far as class-wise distribution of towns in different region is concerned, it is observed that in the NUGP, the maximum number of towns isconcentrated in the category of Class IV (10-20,000 range) but declined during 1991 to 2001. Further, Figure 10 shows that the number of towns under the first three categories (Class I, II and III) has increased in 2001 over 1991 and the subsequent Census has recorded a decline in their numbers.

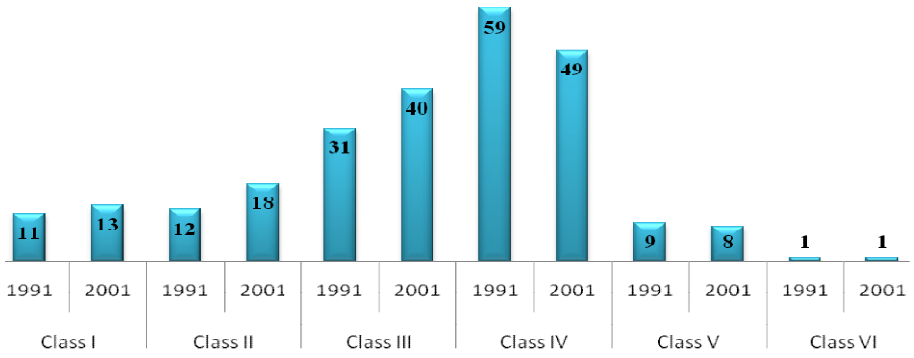


Figure 10: Class-wise number of towns in Northern Upper Ganga Plain

In SUGP, increase in number of towns in 2001 over 1991 is higher than that in the NUGP, as is exhibited by Figure 11. However, pattern of distribution of towns across categories is similar. The number of towns shows an increase up to Class-IV and thereafter it shows a decrease. Further, the number of towns in both the periods is largest under Class-IV (10-20,000), closely followed by Class-III (20-50,000).

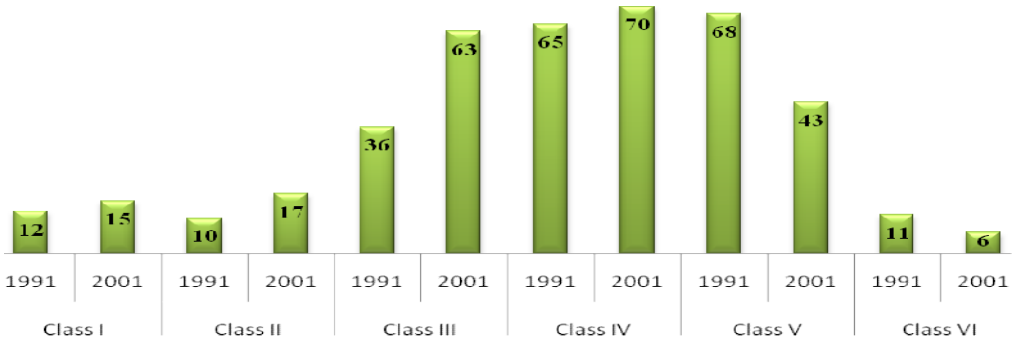


Figure 11: Class-wise number of towns in Southern Upper Ganga Plain

In the CR, distribution of towns across categories is quite different from that in the Upper Ganga plains. In this region, number of Class-V towns smaller towns with population in the range of 5-10,000) is observed highest among all the categories, followed by Class-IV and Class-III towns. If we compare the number of towns in 1991 to that in 2001, we find that the number of towns under Class I, III, and IV has increased in 2001 over 1991, while in all the remaining categories, it has declined in 2001 over 1991 (Figure 12).

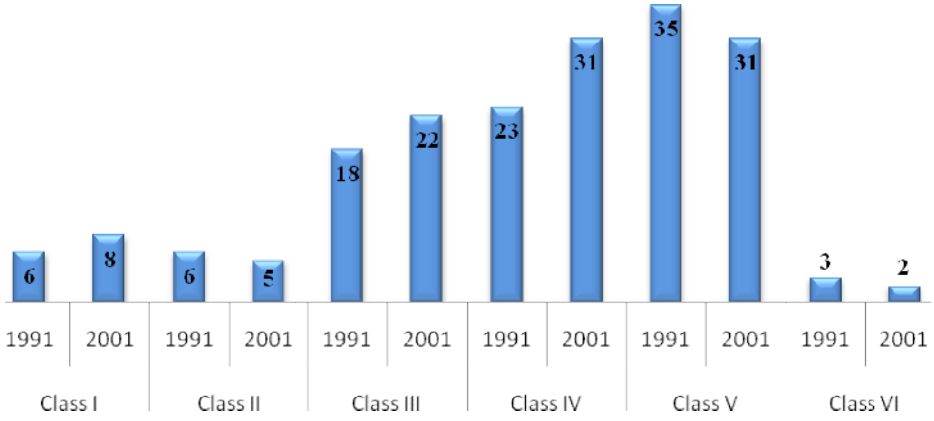


Figure 12: Class-wise number of towns in Central Ganga Region

Figure 13 shows that the number of towns in the SR increases with the increase in class category up to the Class-IV and thereafter it declines in both the census years. The highest concentration of towns in both the years is under Class-IV, followed by Class-V and Class-III. More or less similar pattern is also observed in the ER where largest concentration is of smaller towns under Class IV, followed by Class-V and Class-III (Figure 14).

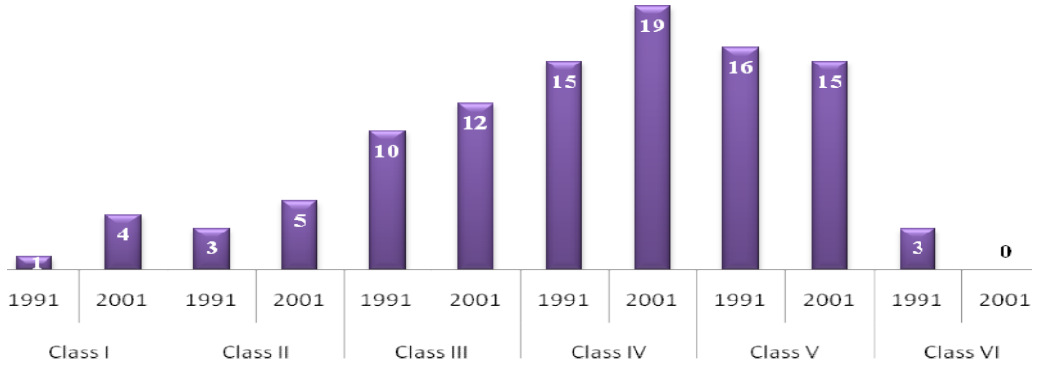


Figure 13: Class-wise number of towns in Southern Ganga Region

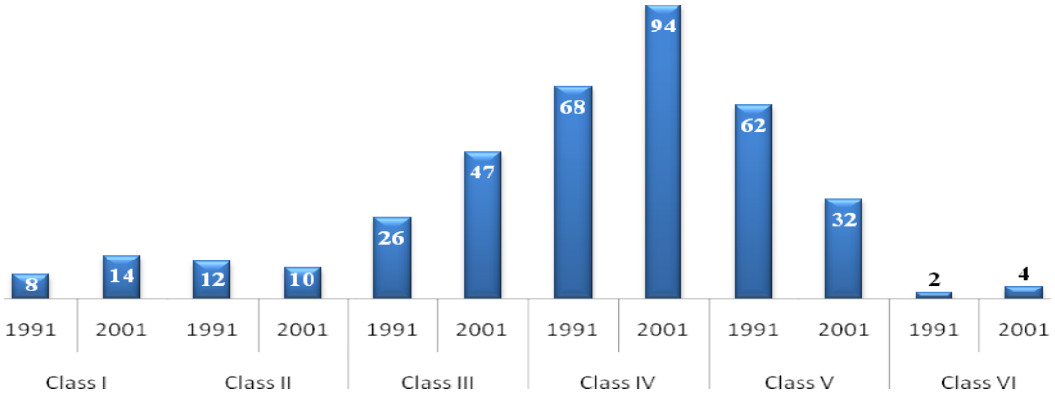


Figure 14: Class-wise number of towns in Eastern Ganga Region

On the basis of above analysis, it can be concluded that although the highest concentration of number of towns in the State corresponds to smaller towns under Class-IV, the number of class I and class II towns has also increased in 2001 census over 1991 census. Further, the growth of Class-I and Class-II i.e., larger towns is relatively higher in Upper Ganga Plains than the other regions.

5. Urban Amenities

5.1. Sources of Drinking Water

During the last 10 years (2001-2011), the number of total households in the State has increased from 257.61 lakhs 2001 to 329.24 lakhs in 2011 -corresponding to 2.79 percent per annum, while the corresponding number in the urban areas has increased from 51.71 lakhs in 2001 to 74.49 lakhs in 2011 -i.e., 4.41 percent per annum. Thus, number of urban households grew much faster than the total number of households. Region-wise number of total and urban households shown in the Table 1 reveals that the shares of CR and NUGP in the total households of the State have increased in 2011 over 2001 while for all other

regions, it has declined. In case of urban areas, the highest increase in the percentage share of households is observed in the NUGP, followed by SUGP. It is significant to note that although, the ER shares 37.51 percent of total households of the State, its percentage share in the urban households is only 19.70. Contrary to this, the NUGP constitutes only 16.13 percent of total households of the State, its share in the total urban households is much higher at 28.46 percent in 2011. Similarly, the CR comprises only 10.87 percent of total households, while its share in the urban households is 20.62 percent. The Table 1 also reveals that the percentage share of NUGP in the total urban households of the State has significantly increased in 2011 over the 2001 figure, while in case of all other regions, the percentage share has decelerated. It can be concluded that urbanization has increased faster in NUGP than the other regions of the State.

Table 1: Region-wise Trends in Number of Total and Urban Households in Uttar Pradesh

	Census	NUGP	SUGP	CR	SR	ER	STATE
Total households in Lakh	2001	39.05	74.12	28.00	17.03	99.40	257.61
		(15.16)	(28.77)	(10.87)	(6.61)	(38.59)	(100)
	2011	53.12	78.38	56.98	17.27	123.49	329.24
		(16.13)	(23.81)	(17.31)	(5.24)	(37.51	(100)
Urban Households in Lakh	2001	12.93	13.62	11.20	2.88	11.08	51.71
		(25.01)	(26.34)	(21.65)	(5.57)	(21.43)	(100)
	2011	21.20	19.43	15.36	3.83	14.68	74.49
		(28.46)	(26.09)	(20.62)	(5.14)	(19.70)	(100)
Rural Households In Lakh	2001	26.12	46.75	33.90	10.85	88.28	205.90
		(12.68)	(22.71)	(16.47)	(5.27)	(42.87)	(100)
	2011	31.92	58.95	41.63	13.44	108.81	254.75
		(12.53)	(23.14)	(23.33)	(5.27)	(42.71)	(100)

Note: Figures in parentheses are percentages to the total

Table 2 shows the region-wise trends in the percentage distribution of urban households by the sources of drinking water. In 2001, 54.92% of total households had access to the drinking water through tap and 40.99% through hand pumps. Only 1.63% had access to water from tube-well/borehole and 1.94% from wells. In 2011, households getting water from tap and hand pumps has declined to 52.0% and 36.75%, respectively, whereas urban households having drinking water through tube-well/borehole has increased to 9.59%. The share of well water has also declined in 2011.

Regional pattern of distribution of urban households by sources of drinking water indicates that in the case of tap water in 2011, the highest percentage share is observed in CR, followed by SR. Further, the percentage share of tap water has increased in the CR and the SR, while in all other regions it has declined. However, tap continues to remain the key source of water supply to the urban household in all the regions. Next to tap water is the

hand pump which occupies the second place in terms of sources of drinking water. Its percentage share in the sources of drinking water has declined in the Upper Ganga Plains and increased in all other regions. There has been significant increase in the percentage share of households having tube-well/borehole as a source of drinking water. The share of well water has declined in 2011 in all the regions. All other sources of water have negligible share in all the regions.

Table 2: Region-wise Trends in the Percentage Distribution of Urban Households by Sources Drinking Water in Uttar Pradesh, 2001-2011

Sources	Census	NUGP	SUGP	CR	SR	ER	STATE
Tap	2001	54.75	51.02	56.40	51.52	59.32	54.92
	2011	54.56	46.43	74.11	65.17	54.33	52.00
Hand pump	2001	43.23	44.92	38.47	36.47	37.29	40.99
	2011	33.70	39.24	44.59	58.14	40.47	36.75
Tube well/	2001	0.98	1.81	2.58	0.87	1.42	1.63
Borehole	2011	9.78	12.51	16.27	3.84	4.83	9.59
Well	2001	0.08	0.96	1.90	10.39	3.15	1.94
	2011	0.29	0.38	0.86	4.51	1.74	0.83
Tank, pond lakes	2001	0.13	0.06	0.16	0.02	0.09	0.10
	2011	0.30	0.22	0.26	0.23	0.16	0.22
Others	2001	0.84	1.24	0.49	0.72	0.55	0.8
	2011	1.36	1.21	1.06	1.02	0.81	1.06

5.2. Access to Bathroom Facilities

Table 3 shows trends in the distribution of households by the availability of bathroom facilities inside households. It is obvious that the percentage share of households having bathroom facility has been much higher in urban areas than in the rural areas. Moreover, number of households with bathroom facilities has significantly increased in 2011 over 2001. Across the State in rural areas it has increased from 19.91% in 2001 to 46.41% in 2011 and from 63.77% to 84.62% in urban areas. The Census 2011 also reported number of households having bathroom enclosing without roof and at the state level there were 29% such households in rural areas and about 15% in urban areas respectively.

While comparing the pattern of availability of household bathroom among various regions of the state, it is found that in 2011NUGP (91.86%) accounted for the highest percentage followed by CR (85.3%), , SUGP (81.6%),SR (80.4%) and then ER which is the lowest (78.59%). As regards rural areas, by 2011 while number of households with bathroom facilities has substantially increased, however more than half of them still do not have a proper roof for cover.

Table 3: Region-wise percentage distribution of households having bathroom facilities

Region	2001			2011		
	Rural	Urban	Total	Rural	Urban	Total
NUGP	37.97	72.93	49.56	70.0 (30.12)	91.86 (11.14)	78.72 (22.54)
SUGP	15.88	58.79	25.56	45.82 (30.12)	81.58 (16.54)	54.69 (26.75)
CR	23.33	66.52	34.05	49.94 (36.51)	85.34 (14.53)	59.48 (30.59)
SR	19.64	53.51	26.75	43.92 (29.31)	80.43 (21.53)	52.02 (27.59)
ER	15.44	59.02	20.30	39.11 (26.10)	78.49 (16.79)	43.79 (24.99)
STATE	19.91	63.77	28.72	46.56 (29.41)	84.62 (14.90)	55.17 (26.12)

Note: Figures in parentheses are the percentage of households having bathrooms enclosed without roof.

5.3. Access to Toilet Facilities

As per the Census 2011 it is found that over three quarter of the rural households in the state do not have access to any kind of toilet facility either inside the house or on the homestead, while in urban areas the situation appears to be much better with only about 16% households not having direct access. State and regional pattern of availability of household toilets for 2001 and 2011 is presented in Table 4. It is noted that during the last decade apparently the state has not made significant improvements in terms of percentage of households with direct access to toilets.

The Census has classified toilets in three types, apparently based on the design features of platform and also the sub-structure. These are namely, pit latrines, water closet toilets (i.e., with a water seal) and other toilets. However, there appears to be lack of clarity in this classification with regard to pit toilet being with or without a water seal, the final disposal arrangement in the case of w/c toilets and 'other toilets'. The data indicate shift away from pit latrines and towards water closet toilets – the latter offering improved aesthetics and experience. The share of 'other toilet' facilities has also declined in all the regions. Among the various regions, urban areas in SUGP and NUGP have achieved fairly high sanitation coverage ranging from 82 – 93% respectively.

5.4. Sources of Cooking Fuel

Table 6 shows the distribution of households in the State by sources of cooking fuel. In rural areas, firewood is the major source of cooking fuel in both the census periods. It is followed by cow dung and crop residue. Contrary to this, LPG is the major source in urban areas, followed by firewood. It is interesting to know that the percentage shares of households having firewood and LPG as cooking fuel in rural areas have increased in 2011 compared to 2001, while the share of households using cow dung and crop residue has declined. Rural households using kerosene, biogas, and electricity as cooking fuel have negligible share. In urban areas, as expected, the

percentage share of households using firewood, cow dung, kerosene, crop residue and coal has declined while the share of LPG has increased substantially.

Table 4: Region-wise distribution of household level toilet availability (%)

Region	Location	2001				2011			
		Pit Latrines	Water Closet toilet	Other Toilets	No Toilet	Pit Latrines	Water Closet toilet	Other Toilet	No Toilet
NUGP	Total	16.63	13.52	27.64	42.20	7.67	55.72	4.38	32.23
	Rural	14.58	4.71	23.69	57.01	10.13	36.20	4.59	49.08
	Urban	20.78	31.31	35.62	12.29	3.97	85.11	4.07	6.85
SUGP	Total	11.43	7.98	16.45	64.14	4.10	30.91	2.51	62.48
	Rural	9.66	1.96	11.23	77.15	4.56	16.22	1.77	77.44
	Urban	17.50	28.65	34.38	19.47	2.68	75.48	4.74	17.10
CR	Total	10.60	9.46	10.91	69.04	3.66	29.51	0.92	65.91
	Rural	7.93	1.09	5.60	85.38	4.32	11.44	0.65	83.58
	Urban	18.67	34.80	26.99	19.55	1.85	78.50	1.63	18.02
SR	Total	9.36	8.13	8.05	74.46	5.12	25.13	0.62	69.13
	Rural	7.80	2.07	5.04	85.09	5.81	13.58	0.47	80.14
	Urban	15.21	30.97	19.40	34.42	2.70	65.69	1.13	30.48
ER	Total	7.10	5.10	7.19	80.61	2.84	18.67	0.53	77.97
	Rural	6.01	1.44	5.13	87.42	2.82	11.79	0.46	84.92
	Urban	15.76	34.25	23.66	26.33	3.00	69.55	1.06	26.38
STATE	Total	10.29	7.98	13.16	68.57	4.18	29.77	1.70	64.35
	Rural	8.34	1.95	8.94	80.77	4.54	15.91	1.31	78.23
	Urban	18.07	31.98	29.96	19.99	2.94	77.17	3.00	16.89

Table 6: Percentage Distribution of Households by Sources of Cooking Fuel in Uttar Pradesh

Sources	2001			2011		
	Rural	Urban	Total	Rural	Urban	Total
Firewood	47.74	30.42	44.26	54.40	24.82	47.71
Crop residue	16.20	4.00	13.75	10.50	2.55	8.70
Cow dung	32.36	7.36	27.34	27.86	6.91	23.12
Coal, Lignite, Charcoal	0.10	1.55	0.39	0.12	0.27	0.25
Kerosene	0.48	9.46	2.28	0.23	2.43	0.72
LPG	2.60	46.01	11.31	6.39	61.75	18.91
Electricity	0.11	0.28	0.14	0.08	0.12	0.09
Biogas	0.16	0.44	0.22	0.13	0.24	0.16
Any other	0.13	0.15	0.14	0.12	0.13	0.12
No cooking	0.13	0.34	0.18	0.18	0.34	0.22

Table 7presentsregion-wise distribution of households by sources of lighting. All Regions in the state except for NUGP show kerosene as major source of lighting followed by electricity. However in the case of NUGR by 2011 electricity has become the major source of lighting.

Table 7: Region-wise distribution of Households By Source of Lighting in Uttar Pradesh (%)

Region	Location	Electricity		Kerosene		Solar energy		Other oil		Any other		No lighting	
		2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
NUGP	Total	49.18	57.24	50.16	41.01	0.28	0.40	0.10	0.33	0.12	0.75	0.15	0.26
	Urban	82.53	86.36	16.79	11.83	0.21	0.21	0.07	0.27	0.17	0.91	0.23	0.42
SUGP	Total	29.09	37.11	70.18	61.61	0.38	0.44	0.11	0.32	0.10	0.27	0.14	0.25
	Urban	76.28	78.45	22.86	20.28	0.28	0.21	0.09	0.24	0.16	0.34	0.33	0.49
CR	Total	29.91	32.96	69.44	65.80	0.35	0.61	0.09	0.22	0.07	0.19	0.14	0.22
	Urban	82.48	82.37	16.65	16.46	0.24	0.19	0.13	0.22	0.17	0.31	0.33	0.44
SR	Total	24.00	33.50	75.22	65.42	0.52	0.54	0.08	0.26	0.09	0.15	0.10	0.14
	Urban	69.52	73.76	29.62	25.21	0.32	0.20	0.09	0.27	0.16	0.24	0.29	0.32
ER	Total	28.80	30.39	70.56	68.61	0.37	0.46	0.08	0.24	0.08	0.16	0.11	0.15
	Urban	81.42	79.76	17.92	19.22	0.23	0.24	0.08	0.23	0.12	0.24	0.23	0.31
U P	Total	31.90	36.93	67.43	61.84	0.36	0.47	0.09	0.27	0.09	0.29	0.13	0.20
	Urban	79.91	81.54	19.31	17.11	0.24	0.21	0.09	0.24	0.16	0.47	0.28	0.41

Source: Census 2001, 2011

In urban areas, electricity is the major source, followed by kerosene for all the regions. It is interesting to know that the percentage shares of households having electricity as source of lighting have increased in 2011 census over the 2001 census, while the share of households using kerosene has declined. Households using solar energy, other oil, and any other source of lighting have negligible share in the total number of households.

6.0. Trends in Per Capita Consumption Expenditure

Monthly per capita expenditure (MPCE) pattern across urban and rural areas of the state on food and non-food items is presented in Table 8. It is noted that at current market prices, average MPCE in rural areas has increased from Rs.274 in 1993-94 to 832 in 2009-10, while in urban areas, it has increased from Rs.389 to Rs.1512 during the same period which is far more than the rise recorded for the rural areas. For instance, the ratio of MPCE in urban areas to rural areas has increased from 1.42 in 1993-94 to 1.82 in 2009-10 suggesting that disparities between rural and urban are as have increased overtime. The data also indicate that the percentage share of food items in the total MPCE has been continuously declining in both the rural and urban areas. However, on an average, the share of food items in the MPCE has been higher in rural areas than the urban areas, whereas it is just reverse in regard of the share of non-food items. For instance, in 2009-10, an average consumer in urban areas spent about 60 percent of its total MPCE on non-food items, whereas its counterpart in rural areas spent only about 40 percent.

Table 8: Trend in per capita monthly consumption expenditure on food and non-food items in Uttar Pradesh (nominal values)

Year	Average MPCE (Rs)		Percentage share of Food in MPCE		Percentage share of Non-food in MPCE	
	Rural	Urban	Rural	Urban	Rural	Urban
1993-94	274	389	61.50	56.00	38.50	44.00
1999-00	467	690	57.42	50.49	42.58	49.51
2004-05	647	978	53.45	47.13	46.55	52.87
2009-10	832	1512	53.74	40.24	46.26	59.76

Source: compiled from various NSS reports

6.1 Nutritional Status of Rural and Urban Households

The data compiled from various NSSO rounds on per capita intake of calories, protein and fats in rural and urban households in Uttar Pradesh and India is presented in Table 9. A perusal of the Table 9 reveals that average per capita calories intake has been higher in rural households than urban households in Uttar Pradesh and India both. For instance, as against an intake of 2575 calories per capita in rural Uttar Pradesh (1972-73), in rural India it was lower by 12% at only 2266. However, over the years this gas is found to have narrowed down. On the other hand in the case of urban areas, the difference in calorie intake between Uttar Pradesh and India is found to be significant with some years shown a reverse trend compared to the rural areas. In general, per capita calories intake both in rural and urban areas in Uttar Pradesh and India shows a declining trend.

As regards protein intake,it is found to have declined both across the country as well as in Uttar Pradesh. In UP it has registered a sharper decline from 76 MG in 1972-73 to 63.3 MG in 2009-10; while in India, the corresponding values are 62 MG and 59.3 MG respectively. In case of urban households of Uttar Pradesh, it has increased from 62 MG in 1972-73 to 65.10 MG in 2004-05 and then declined to 60.10 MG in 2009-10; whereas in urban India, it increased from 56 MG in 1972-73 to 58.50 MG in 1999-00 and then declined to 57 MG in 2004-05. In 2009-10, the per capita protein intake has reached the peak of 58.80 MG in urban India and 60.1 in urban UP.

On the other hand it is noted that the average per capita intake of fats in rural and urban areas both across Uttar Pradesh and all-India shows increasing trend. In rural areas, it has increased from 28 MG in 1972-73 to 40.3 MG in 2009-10, while the corresponding increase in urban areas has been from 35 MG to 45.70 MG. At all India level, per capita intake of fats has gone up from 24.0 MG in 1972-73 to 43.70 MG in 2009-10 in rural areas and from 36.0 MG to 53.0 MG in urban areas. The trends show that the average per capita calories and protein intakes in rural and urban areas have declined, while the intake of fats has increased in both Uttar Pradesh and India.

Table 9: Trends in per capita intake of calories, protein and fats in Rural and Urban Households in Uttar Pradesh

Year	Calorie (K.cl)				Protein (MG)				Fat (MG)			
	Uttar Pradesh		India		Uttar Pradesh		India		Uttar Pradesh		India	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1972-73	2575	2161	2266	2107	76.0	62.00	62.0	56.00	28.0	35.00	24.0	36.00
1983	2399	2043	2221	2089	73.0	62.00	62.0	57.00	29.0	34.00	27.0	37.00
1993-94	2307	2114	2153	2071	70.4	63.20	60.2	57.20	35.5	41.20	31.4	42.00
1999-00	2327	2131	2149	2156	69.7	62.00	59.1	58.50	37.6	45.50	36.1	49.60
2004-05	2200	2124	2047	2020	65.9	65.10	57.0	57.00	37.5	46.10	35.5	47.50
2009-10	2181	2072	2147	2123	63.3	60.10	59.3	58.80	40.3	45.70	43.1	53.0

Source: various NNSO Rounds

As shown in Table 10 it is also noted that the percentage share of cereals in the total calories intake has significantly declined during the last 15 years both in rural and urban areas. In Uttar Pradesh, the share of cereals has declined from 69% in 1993-94 to 63% in rural areas and from 59% to 55% in urban areas. At all-India level, the percentage share declined from 71% to 60% in rural areas and from 58% to 50% in urban areas during the same period. This implies that over the period, share of non-cereals food items in the total calories intake has increased significantly, especially in the urban areas. For instance in 2009-10, almost 50% of total calories requirement in urban areas at all-India level was met from consumption of non-cereal food items, such as milk & milk products, meat, fish & eggs and fruits & vegetables, etc. Therefore, national food security should not be viewed only in terms of availability and accessibility of cereals but also in terms of overall food items.

Table 10: Trend in the percentage share of cereals and other food items in the total calories Intake

Year	Uttar Pradesh				India			
	Rural		Urban		Rural		Urban	
	Cereals	Others	Cereals	Others	Cereals	Others	Cereals	Others
1993-94	68.67	31.33	59.37	40.63	71.01	28.99	58.52	41.48
1999-00	66.73	33.27	57.4	42.6	67.55	32.45	55.05	44.95
2004-05	66.91	33.09	58.47	41.52	67.54	32.31	56.08	43.84
2009-10	62.99	37.01	55.47	44.51	60.38	39.5	50.37	49.55

Source: Compiled from various NSS reports

Percentage share of different food items in the total protein intake in rural and urban areas in Uttar Pradesh and India is shown in Table 11. The share of cereals in the total protein intake has

declined from 70.2% in 1993-94 to 66.1% in 2009-10 in rural areas in Uttar Pradesh. Share of pulses in the total protein intake has also declined after 1999-00. Share of milk and milk products first declined from 10.3% in 1993-94 to 9.2% in 1999-00 and then increased to 9.7% in 2009-10, whereas share of meat, fish & eggs has varied in a range of 1.5% to 2.3%. Other food items show a continuous increase in their share in the total protein intake.

Table 11: Percentage share of different food items in the total protein intake

Source of Protein	Uttar Pradesh				India			
	1993-94	1999-00	2004-05	2009-10	1993-94	1999-00	2004-05	2009-10
				RURAL				
Cereals	70.2	68.86	69.17	66.1	69.42	67.43	66.37	60.18
Pulses	10.58	11.52	9.61	8.78	9.76	10.91	9.47	8.28
Milk & milk Products	10.32	9.24	9.48	9.7	8.81	9.19	9.28	9.37
Meat, Fish & eggs	1.5	2.33	1.56	2.17	3.66	4.04	3.98	5.85
Others	7.4	8.05	10.18	13.25	8.35	8.43	10.84	16.25
				URBAN				
Cereals	63.52	62.29	60.7	60.11	59.41	57.03	56.16	51.25
Pulses	11.32	12.08	9.75	9.33	11.54	13.1	11.00	10.14
Milk % milk Products	11.95	11.76	10.64	12.1	11.66	12.43	12.33	12.53
Meat, Fish & eggs	3.31	3.69	3.33	3.27	5.29	5.98	5.47	7.57
Others	9.9	10.18	15.58	15.18	12.1	11.46	15.04	18.46

At the all-India level also, share of cereals and pulses in the total protein intake has declined during the period 1993-94 to 2009-10, while the share of milk & milk products, meat, fish & eggs and others has increased during the same period. Table 11 also reveals that rural households in Uttar Pradesh use more cereals, pulses and milk &milk products in their diet to get protein than their counterparts in other parts of the country, while urban households in India relatively use more meat, fish & eggs and other food items in their diet to get protein than their counterparts in Uttar Pradesh.

In urban Uttar Pradesh also, the share of cereals in the total protein intake has declined slightly from 63.52% in 1993-94 to 60.11% in 2009-10. In the case of pulses, the share has varied in a narrow range from 9.3% to 12.08%. As far as milk & milk products group is concerned, it is observed that its share in the total protein intake has also remained in a narrow range from 10.6% to 12%. In the case of meat, fish & eggs the share in the total protein intake has not varied much either.

It can be concluded from the analysis of the data shown in Table 11 that the share of food grains (cereals plus pulses) in the total protein intake has declined during the last 15 years, while that of

other food items has increased during the same period. The shares of milk & milk products and meat, fish & eggs have remained more or less stable since 1999-00. However, at all-India level, the results are found slightly different. On an average, the share of food grains (cereals + pluses) in the total protein intake is much lower in urban India than in the urban Uttar Pradesh. The share of meat, fish & eggs and other food items, on the contrary, is observed to be higher in urban India than in urban Uttar Pradesh.

7. Urban Occupational Structure

Trends in occupational structure of urban workforce are shown in Figure 15. It is significant to note that the percentage share of self-employment in the total employment has constantly increased up to 2004-05 and, thereafter, it declined in 2009-10. As the Figure brings to the fore, between 1987-88 and 2004-05, the share of self-employment increased by 3.7 percent point, while between 2004-05 and 2009-10, it declined by 5.8 percent point. The data, however, do not suggest whether it was a distress kind of self-employment or a growth-induced self-employment. For instance, if workers do not get regular salary or wage-employment due to shrinking of jobs in the organized sector, they would be forced to undertake their petty and lesser gainful self-employment in the informal sector of the economy. Contrary to this, if well-educated and trained workers initiate self-employment activities in the emerging sectors, this kind of employment would be desirable for the economy as these activities would also generate gainful wage employment for other workers as well.

Figure 15 also indicates that the share of regular wage/salary employment remained more or less stable at 34 percent up to 2004-05. However, after 2004-05, there has been about 4 percent point decline in its share in 2009-10. No need to emphasize that regular salaried employment is qualitatively better than the other forms of employment. A decline in its share in 2009-10 is a serious issue suggesting that the fast growth of the formal economy of India could not generate adequate regular employment to the workforce. In fact, during the last one decade or more, there has been a tendency of inform alisation of formal employment, adversely affecting the quality of employment in the economy. Another important fact revealed by Figure 15 is that between 1999-00 and 2004-05,casualization of urban workforce declined by 1.6 percent point, while between 2004-05 and 2009-10, it increased by 3.9 percent point. Thus, during the last five years, regular and self-employment declined, whereas casual employment has increased, indicating towards the deterioration in the quality of employment in the urban areas.

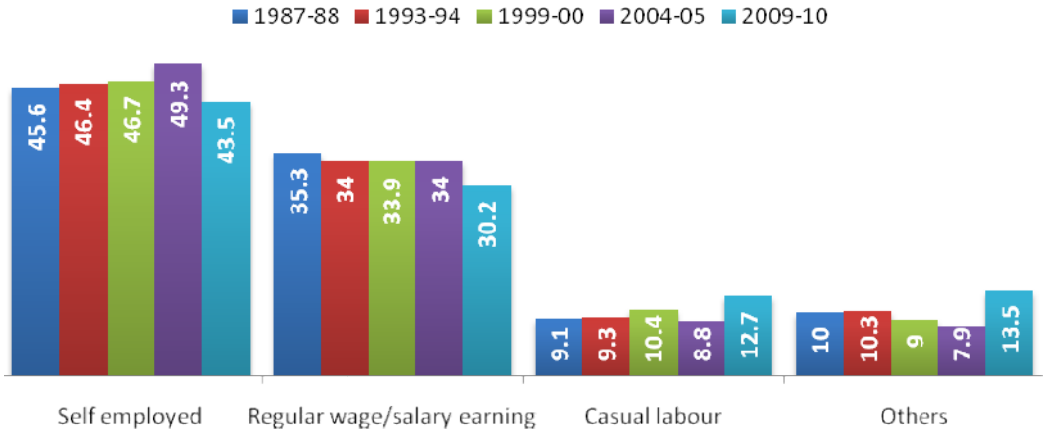
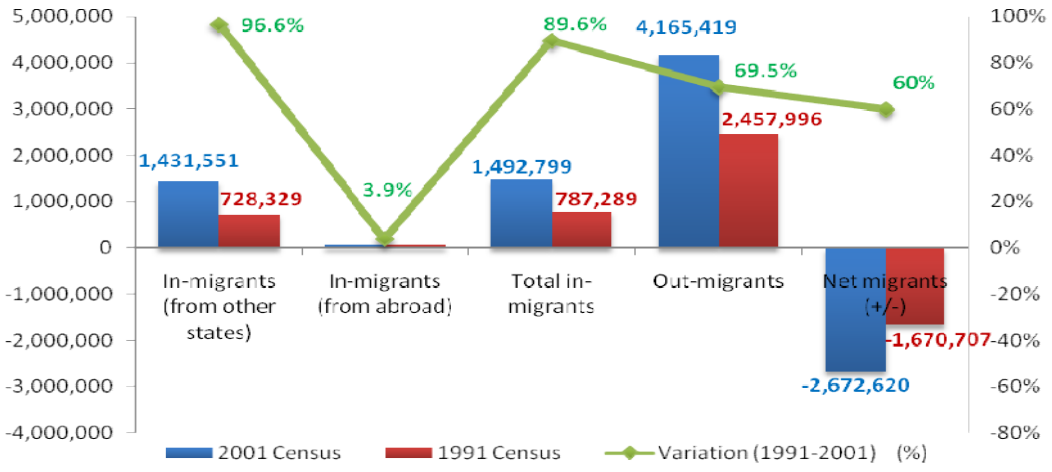


Figure 15: Household Main Occupation (%) in urban areas, Uttar Pradesh, 1983-2010

8. Trends in Migration

There are four types of migration streams—rural to rural, rural to urban, urban to urban and urban to rural. Rural-to-urban and urban-to-urban migrations area are the relevant issuesin the context of the present study. Rural to urban and urban to urban migration is indicative of urban centres as engines of growth. Thus, urbanization depends on three factors—natural growth of population, rural to urban migration and reclassification of rural areas as urban in course of time. As far as total in-migration in Uttar Pradesh is concerned, we find that both in-migrants and out-migrants have significantly increased in 2001 when compared to the data of Census 1991. However, out-migration was much higher than in-migration in both decades . Net migration (in-migration minus out-migration) has remained negative in the state, indicating that number of persons going out of the state was higher than the number coming to the State.



*Uttar Pradesh(includingUttaranchalfor2001Census)

Figure 16: Variation in Migration Profile between for Uttar Pradesh based on Migrants by last residence, 1991-2001 (Duration 0-9 years)

Figure 16 shows that number of net out-migrants has increased from 1.67 lakhs in 1991 to 2.67 lakhs in 2001. Lack of adequate employment and income opportunities to the people of the State forced them to move out in search of better livelihood opportunities outside the State. In 1991, urban areas constituted only 25.44% of total migrants of the State. Its share in the total migrants increased to 28.8% in 2001. Contrary to this, the share of urban area in total female migrants has declined from 10.74% in 1991 to 9.55% in 2001. Figure 17 clearly shows that relatively, the share of rural area in the total female migrants has been higher than their male counterparts. It has also increased in 2001 census over the 1991 census.

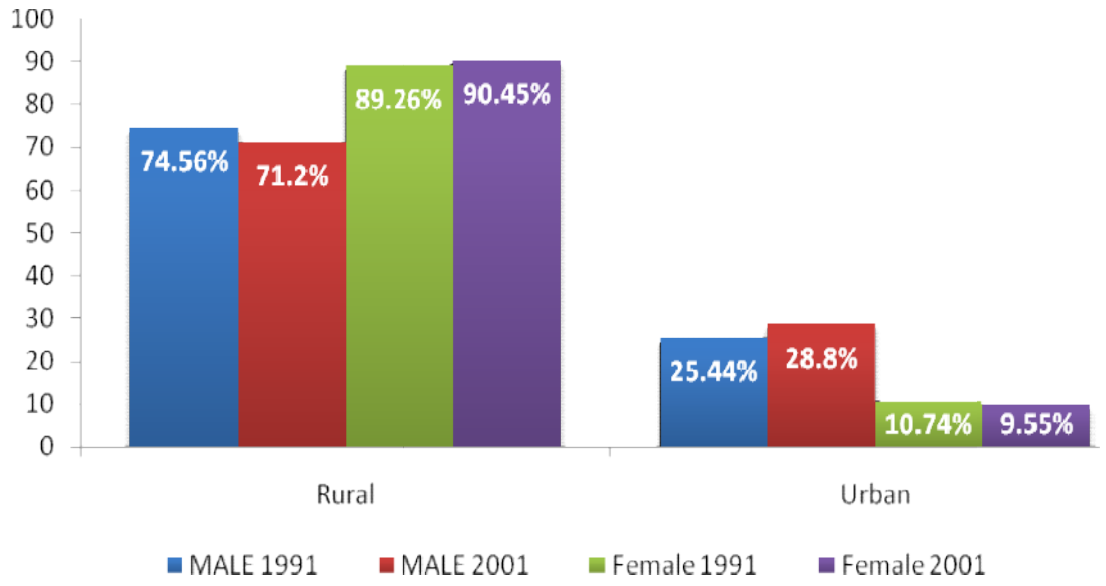


Figure 17: Trends in the Percentage Share of Rural and Urban Migrants in total Migrants (U.P.)

Figure18 demonstartes the percentage share of different migration streams in total rural and urban migration. In case of male migrants, the share of rural to rural migration in the total rural migrants has declined from 61.8% in 1991 to 54.7% in 2001; contrary to this, the percentage share of rural to rural female migrants to the total rural female migrants has remaind more or less stable during 1991-2001. Figure 18 also reveals that percentage share of rural to rural migrants is much higher for rural female than the rural males. Contrary to this, percentage share of rural to urban migrants for rural males is much higher than the rural females. Moreover, percentage share of rural to urban migrants in case of rural males has significantly increased from 38.21 in 1991 to 45.35 in 2009-10, whereas in the case of females, it has increased marginally from 8.6 to 9.17 during the same period. As far as urban to rural migration is concerned, it has declined in 2001 over 1991 in case of both male and female migrants, while there has been an increase in the share of urban to urban migration in case of both male and female migrants.

Table 12 shows details of total migrants in the State for different migration streams. It is noted that the number of migrants in the State has increased by 22% from 29.19 million in 1991 to 35.65 million in 2001. The share of male migrant declined from 14.52% in 1991 to 12.38% in 2001, while the corresponding share of female migrants increased from 85.48% to 87.62%. Total rural

constitute 87.11% and 88.06% of the total migrants respectively in 1991 and 2001. Thus, total urban migrants comprise only about 12-13% of the total migration. Further, out of total rural migrants, share of rural to rural migrants is 86.67% in 1991 and 87.23% in 2001. Thus, rural to urban migration consists of only about 13% of the total rural migration. As far as urban to urban migration is concerned, it is observed that its share in the total urban migration has increased from 68.35% in 1991 to 72.77 in 2001. This shows that the percentage share of urban to rural migration has declined by 4.42 percent point during the period 1991-2001.

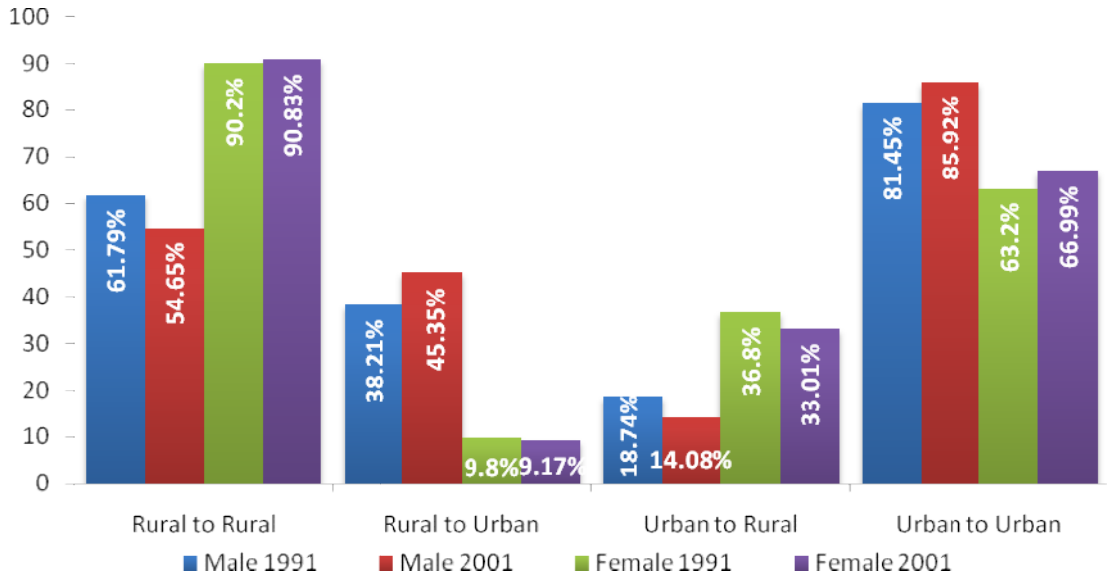


Figure 18: Percentage Share of Different Migration Streams in Total Rural and Urban Migration

Table12: Stream-wise percentage share of male and female migrants in the total migrants in Uttar Pradesh

Migration Stream	Total (in Million)		Male (%)		Female (%)	
	1991	2001	1991	2001	1991	2001
Total Migrants	29.19	35.65	14.52	12.38	85.48	87.62
Total Rural Migrants	25.43	31.39	12.42	10.01	87.58	89.99
Rural to Rural	22.04	27.38	8.86	6.27	91.14	93.73
Rural to Urban	3.39	4.02	35.6	35.49	64.4	64.51
Total Urban Migrants	3.76	4.26	28.69	29.87	71.31	70.13
Urban to Rural	1.19	1.1	17	15.38	83	84.62
Urban to Urban	2.57	3.1	34.15	35.33	65.85	64.67

Gender-wise distribution of migrants show that share of female migrants in the total migrants has increased from 85.48% in 1991 to 87.62% in 2001, while the corresponding share of female migrants in the total migrants has declined, as is obvious from the Table 12. More or less same pattern is observed in case of total rural migrants and rural to rural migrants. However, in the case of rural to urban migration, there is not much difference across censuses, though the percent share of female migrants in the total urban migrants is much higher than their male counterparts in both the censuses. Similarly, the share of female migrants in the total urban to rural migration is

also observed to be much higher than that of male migrants in both the censuses. Moreover, the share of female migrants has increased in 2001 over 1991.

8.1 Regional Pattern of Rural-Urban Migration in Uttar Pradesh

8.1.1 Region-wise and Gender-wise Distribution of Rural-Urban Migration Rates

Figure 19 shows region-wise rural-urban migration rates in Uttar Pradesh for the last two censuses, separately for male and female population. As far as rural–urban migration rates are concerned, Figure 19 clearly shows that except for NUGP, rural to urban migration rates have either remained stagnant or declined in 2001 as compared to the figures of 1991. The highest decline in the migration rate is observed in the CR, followed by ER. In the case of male population, the rural–urban migration rate has increased from 6.34 percent in 1991 to 8.49 percent in 2001 in NUGP. It is interesting to note that the rural-urban migration rates of male population have declined in 2001 over 1991 in all the regions of the State, except for the NUGP.

On an average, rural-urban migration rates in both the censuses are higher for female population than the male population. One of the main factors in this context is marriage. Moreover, their migration is also closely associated with the migration of their husbands as husband migrates from rural to urban area, in most of the cases his wife and children also migrate with him.

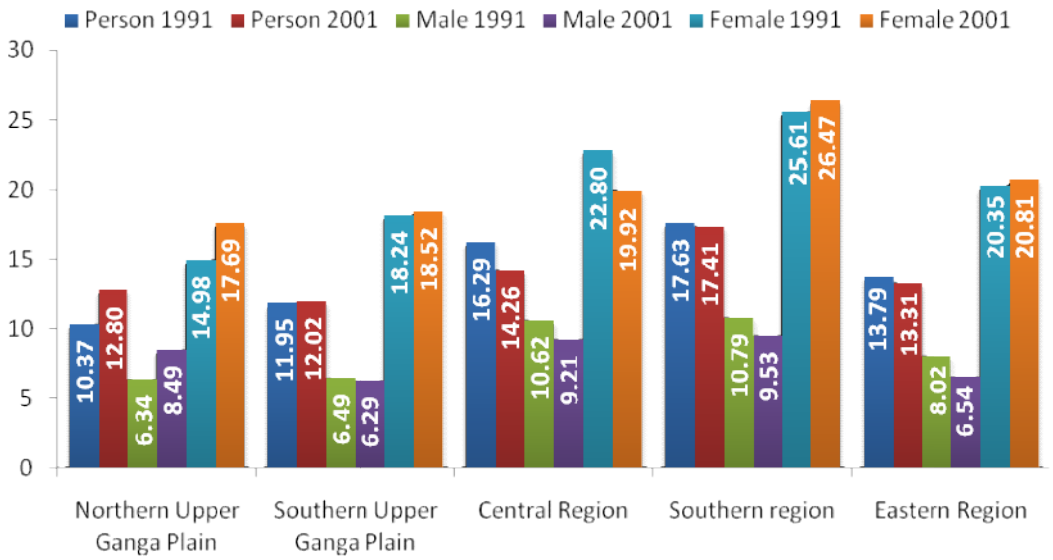


Figure 19: Rural-Urban Migration Rates in U.P. (1991-2001, last residence elsewhere in India)

Another fact emerged from the perusal of Figure 19 is that the migration rates vary across regions. The rural-urban migration rates are found highest in economically backward region SR, followed by CR and ER. However, increase in the migration rate in 2001 over 1991 is observed highest in the NUGP, followed by SUGP. It may be relevant to note that rural –urban migration may be due to push factors (distress factors) or due to pull factors (growth induced factors). The high intensity of

rural-urban migration in SR is largely due to distress factors, while increase in the rural-urban migration rate in the Upper Ganga Plains (north and south both) is mainly due to pull factors.

8.1.2 Region-wise and Gender-wise Rural -Urban Migration Rates of Workers

While estimating rural-urban migration rates of workers, it is interesting to find that there has been an increase in the migration rates of workers across all the regions in 2001 as compared to 1991. For combined population the increase is found to be highest in NUGP, closely followed by SR. It is found to be the lowest in the CR, followed by the ER. Figure 20 demonstrates that in case of male workers, the migration rate is observed to be the highest in SR, followed by CR and ER. However, the increase in the migration rates in 2001 over 1991 is observed highest in NUGP, followed by SUGP. This clearly indicates that although the intensity of migration is highest in SR, followed by CR and ER, the growth in migration rates is highest in NUGP, followed by SUGP.

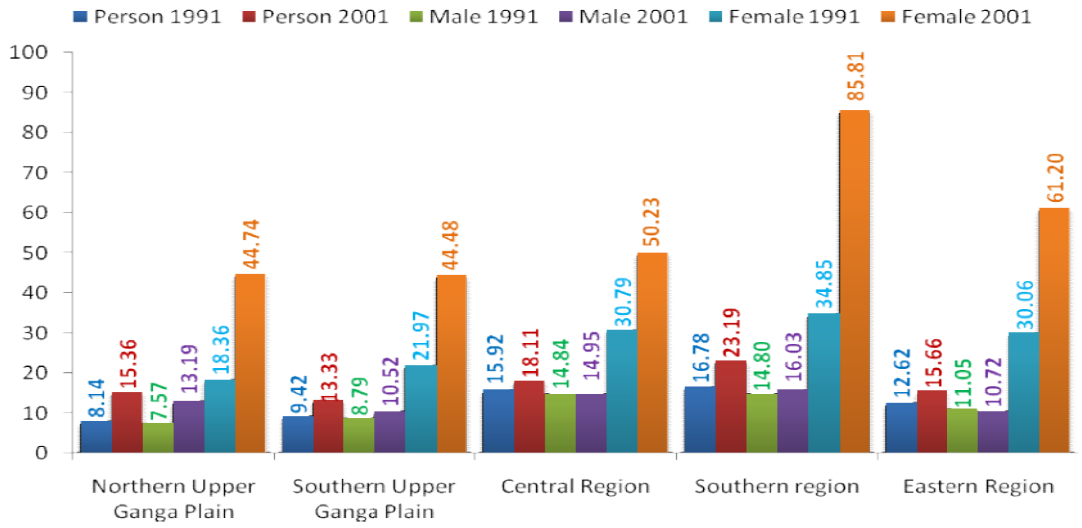


Figure 20: Region-wise Rural to Urban Migration Rate of workers in Uttar Pradesh (1991-2001, last residence elsewhere in India)

In case of women workers, the rate is found to be the highest in SR, followed by ER and CR. It is observed to be the lowest in Upper Ganga Plains. Figure 20 shows that the migration rates among female workers are much higher than their male counterparts across regions. Moreover, the increase in these rates is also observed to be higher in case of female workers than their male counterparts. Observing the region-wise rates, it is found to be the highest in SR, followed by ER and CR. Further, increase in the rate in 2001 over 1991 is estimated highest in SR followed by NUGP and ER. It may also be noted that higher rural–urban migration rates among female workers than the male workers is due to the fact that the work participation rate among female is much lower in comparison to the male population. As the rural-urban migration rate among workers is the ratio of rural to urban migrant workers to the total urban workers. Since number of female urban workers is much lower than the male workers, the migration rate of female workers is affected by the low base of urban female workers.

8.1.3: Occupation-wise Distribution of Rural- Urban Migrant workers

Occupation-wise distribution of rural to urban migrant workers in 2001 is exhibited by Figure 21. The figure shows that other services, including public services constitute the highest share (24%) in the total rural to urban migration. It is followed by electricity, gas and water supply (16%), transport, storage and communication (14%), wholesale and retail trades (9%), and construction and household industries (7% each). The percentage shares of farmers, agricultural labour and mining and quarrying and non-household industries in the total rural to urban migration of workers are observed to be quite low.

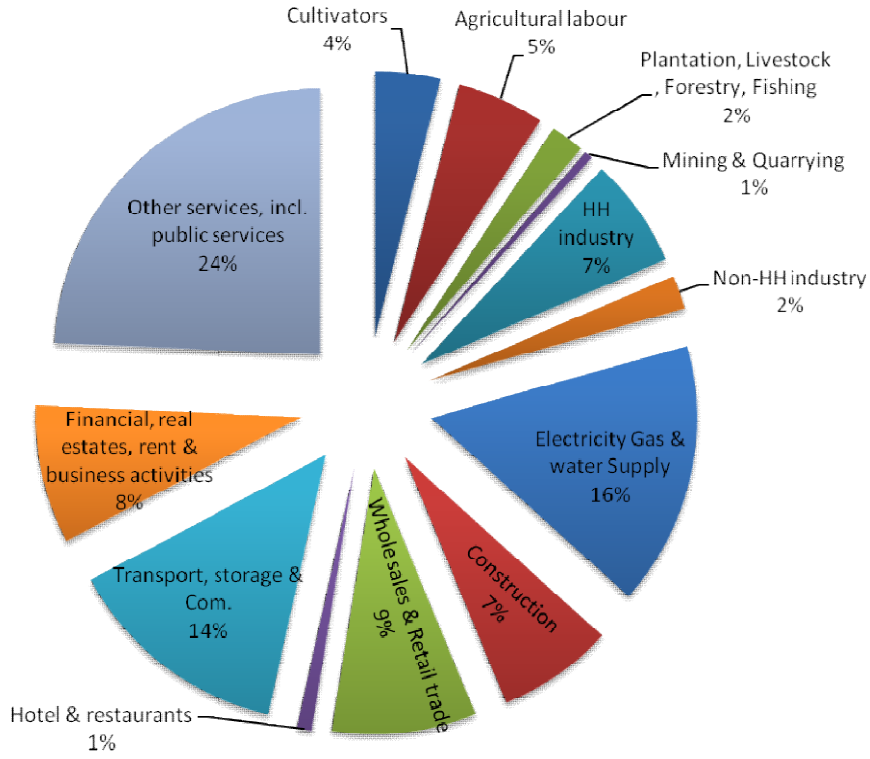


Figure 21: Occupational Classification of Rural to Urban Migrant Workers in U.P. in 2001

9.0. Condition of Slums

Uttar Pradesh has 60 Class I and 46 Class II cities. These cities together have about 286 million people. A majority of them lives in slums where the living conditions and basic amenities are quite dismal. The State has 775 notified and 1868 non-notified slums, with total 2,27,799 households. Table 13 shows that the population of slums in the State has increased by 123% from 26 lakh in 1981 to 58 lakh in 1991 and then further by 33% to 77 lakh in 2001, whereas at the all-India level, it went up by 66% from 279 lakh in 1981 to 463 lakh in 1991 and then further by 33% to 618 lakh in 2001.The percentage of slum population in the state has increased from 13 % in 1981 to 21 % in 1991 and the fraction remains the same in 2001, whereas at all India level, it went up from 17.50% in 1981 to 21.30 % in 1991 and to in 2001.

Table 13 also indicates that class-I towns and cities have substantially higher growth of slum population than class-II towns. Class-I towns in the state account for 29 lakh slum population in 1981 which increased to 31.45 lakh in 1991 and further to 42.35 lakh in 2001. Class-II towns report

6.3 lakh slum population in 1981 which increased to 8.6 lakh in 1991 and further to 11.7 lakh in 2001.

Table 13: Identified/Estimated Slum Population (in Lakh) in Uttar Pradesh (During 1981, 1991 & 2001)

	Urban Population			Identified Slum Population			Percentage of slum Population		
	1981	1991	2001	1981	1991	2001	1981	1991	2001
Uttar Pradesh	198.90	276.06	365.40	25.80	58.39	77.10	13.00	21.10	21.10
India	1594.63	2176.11	2909.44	279.14	462.61	618.26	17.50	21.30	21.30

Class-I Towns and Cities

	Urban Population			Identified Slum Population			Percentage of slum Population		
	1981	1991	2001	1981	1991	2001	1981	1991	2001
Uttar Pradesh	110.74	153.34	202.13	29.07	31.45	42.35	26.30	20.50	20.95
India	1023.91	1400.84	1900.55	242.89	314.30	424.50	23.70	22.40	22.34

Class-II Towns and cities

	Urban Population			Identified Slum Population			Percentage of slum Population		
	1981	1991	2001	1981	1991	2001	1981	1991	2001
Uttar Pradesh	24.111	32.669	44.376	6.337	8.66	11.776	26.3	26.5	26.5
India	182.58	236.288	316.286	36.027	47.151	63.922	19.7	20	20.2

Figure 22 presents the proportion of slum population in Class-I and Class-II towns across UP and India. It is noted that the proportion of slum population in Class-I towns is decreasing while it remains stagnant in Class-II towns. The percentage of slum population in Class-I towns of Uttar Pradesh has decreased from 26.3 (1981) to 20.5 in 1991 and 20.95 in 2001, whereas its proportion in Class-II remained stable in three decades.

Figure 23 shows percentage share of notified and non-notified slums for 2002 and 2008. The percentage share of notified slums has increased almost two fold from 29% in 2002 to 56% in 2008, while that of non-notified slums has declined from 71% to 44%.

As far as growth of slum population in the State is concerned, Figure 24 shows that between 1981 and 2001, it increased by 121.53 percent (about 6% per year), whereas at the all-India level, it recorded a growth of 198.84 percent (9.94% per year). This reveals that slum population in the State grew at a lower rate than the all-India average. This fact is quite obvious as some fast growing states like Gujarat, Maharashtra, Tamil Nadu, Karnataka, Haryana, Delhi, etc. have attracted more people from backward states, including Uttar Pradesh towards their cities. Metropolitan cities such as Mumbai, Delhi (NCR), Bangalore, Ahmadabad, Chennai, Hyderabad Pune, also have high concentration of migrant workers who mostly live in slums. In Uttar Pradesh,

as well, big cities like Kanpur, Varanasi, Allahabad, Lucknow, Ghaziabad, Meerut, Agra, etc. have expanded substantially in terms of slum population.

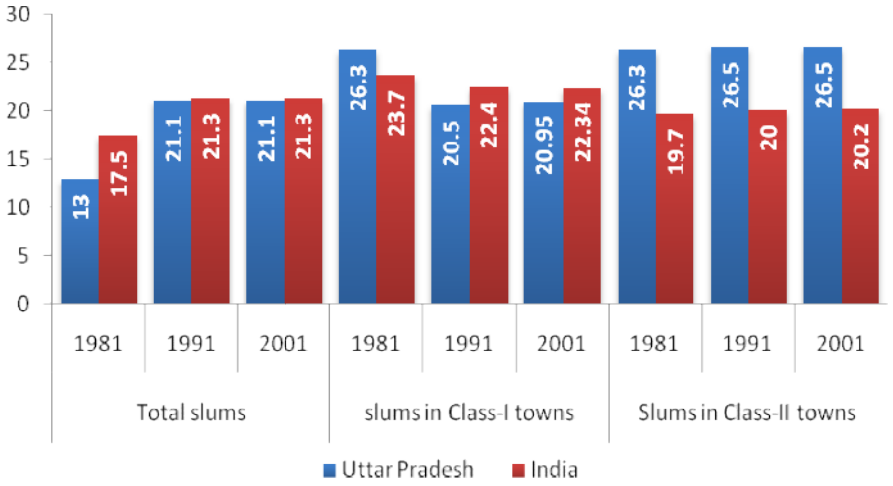


Figure 22: Percentage of slum Population in Uttar Pradesh and India



Figure 23: Percentage of notified and non-notified slums in Uttar Pradesh

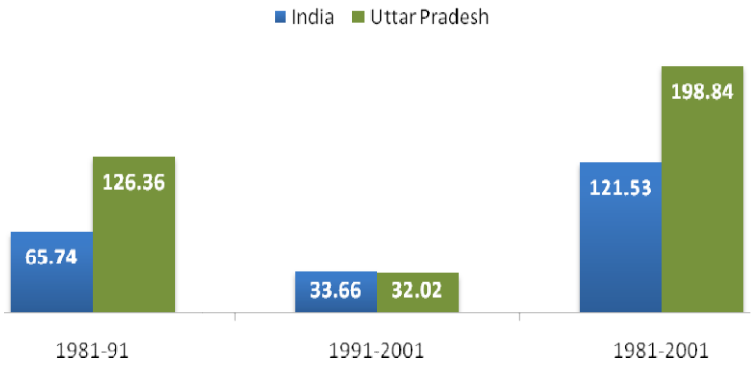


Figure 24: Growth Rate of Slum Population

Figure 25 shows trends in slum population in the three metropolitan cities of the State, namely Kanpur, Lucknow and Varanasi. As the Figure shows, population of these three cities has significantly increased during the last 30 years. The highest increase is observed for the capital city

of Lucknow, followed by Kanpur. Highest number of people living in slums is found to be in Kanpur, followed by Lucknow. It is surprising to note that number of slum dwellers in 1991 over 1981 has declined in these cities. However, the number has again increased in 2001 over 1991. As far as percentage share of slum dwellers in the total population is concerned, Figure 25 shows that in 1981, more than 35 percent of population of Kanpur city resided in slum. However, the percentage significantly declined to the level of about 20% in 1991 and remained more or less at the same level in 2001. Similar pattern is observed in the case of Lucknow and Varanasi.

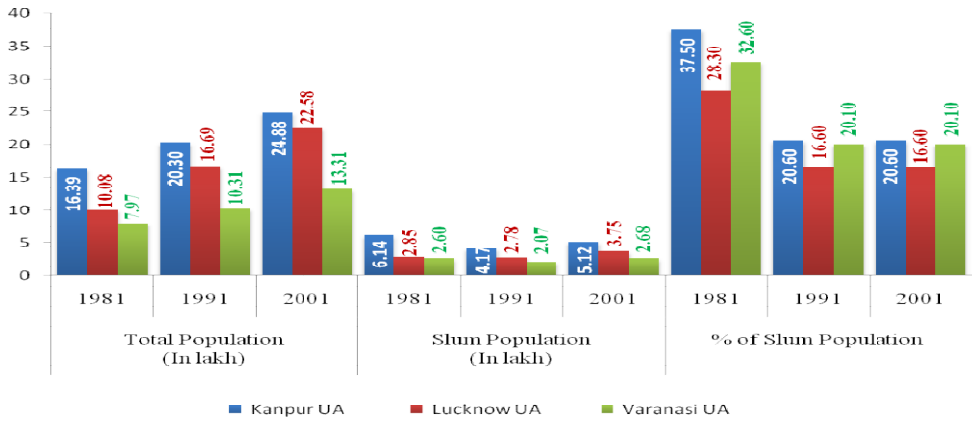


Figure 25: Estimated Slum Population in Metropolitan Cities (Uttar Pradesh)

A majority of slum dwellers in both notified and non-notified slums live in pucca houses. However, percentage of such dwellers is higher in notified slums than the non-notified slums. Figure 26 shows that in notified slums, households living in pucca houses has increased substantially from 61%in 2002 to 89% 2008 whereas in non-notified slums, it increased from 16% in 2002 to a very high 57% in 2008.Over the same period, share of households living in semi-pucca houses in notified and non-notified slums has declined significantlyfrom 38%to just 1%and from 45%to 5% respectively.

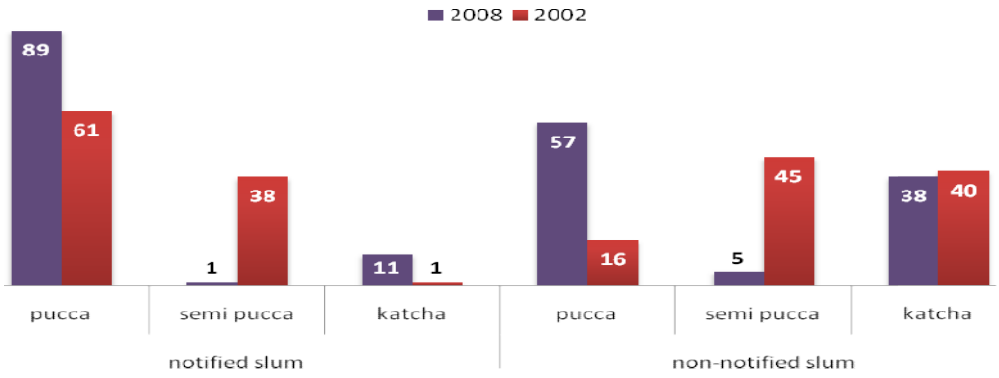


Figure 26: Percentage distribution of slums according to structure of majority of houses in Uttar Pradesh

A majority of slum dwellers in both notified and non-notified slums have tube-well as a major source of drinking water. Figure 27 shows that in notified slums, the difference between the

percentage of households shifted from tap (34 % percent in 2002 to 22 percent in 2008) to tube-well (67% in 2002 to 79 % in 2008) is 12 percent whereas in non-notified, it is 35 percent.

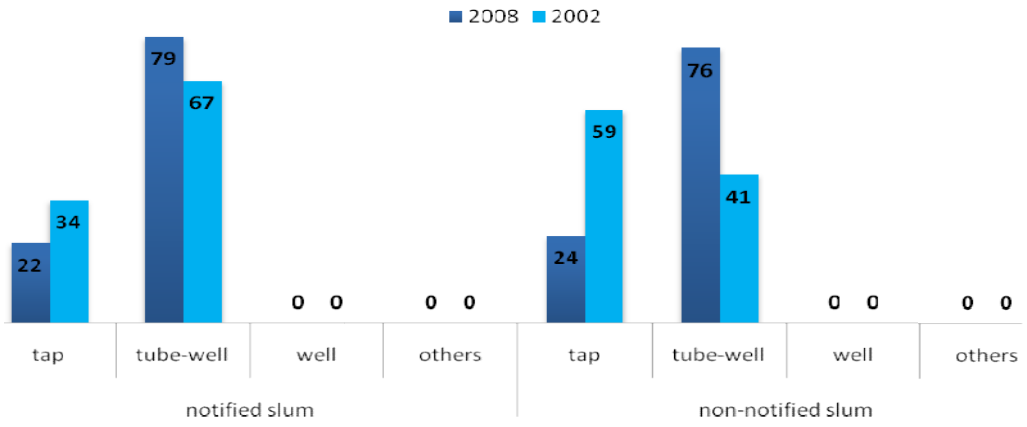


Figure 27: Percentage distribution of slums according to major source of drinking water in Uttar Pradesh

Figure 28 shows the Percentage distribution of slums according to availability of electricity connections in the state. Figure shows maximum proportion of notified slums have electricity in the households and streets. Also, proportion of notified slums having no electricity increased from 1% in 2002 to 15% in 2008.

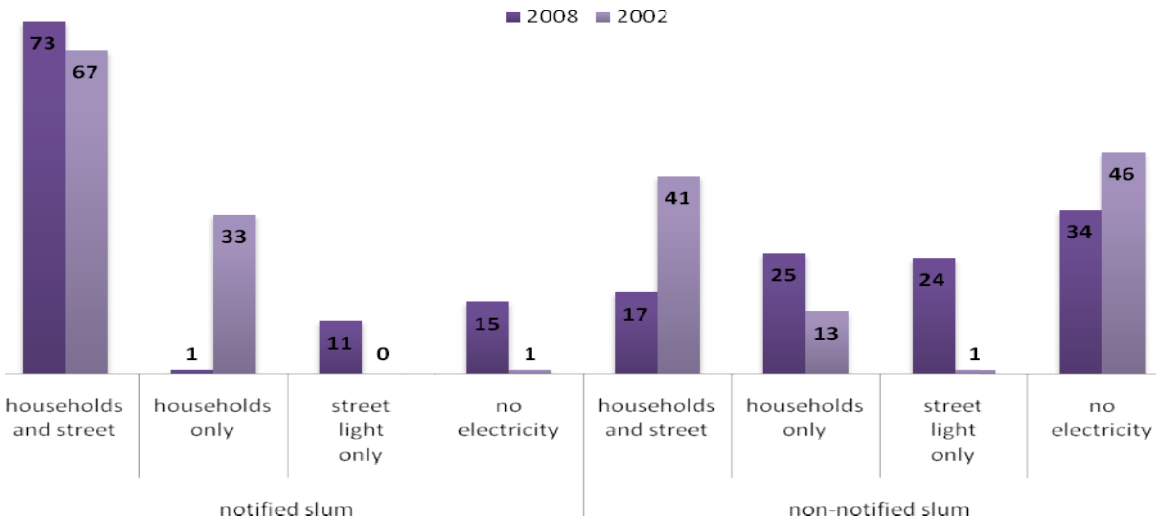


Figure 28: Percentage distribution of slums according to availability of electricity connections In Uttar Pradesh

10.0. State of Industrialization in Uttar Pradesh

Economy of the State is largely agriculture-based as large number of people still draw their livelihood from agriculture; however its growth trajectory has been constantly shifting towards

non-agricultural sectors (industries and services). The share of secondary sector has increased from18.7% in 1999-00 to 21.2% 2008-09, while that of service sector has increased from 43.6 in 1999-00 to 47.1% in 2008-09.

As per the State Development Report, about 80 percent of total industries in the State are under SSI sector. Agro-based industries such as sugar mills, distilleries, dairy products, rice mills, fruits & vegetable processing units, other food & brewages, textiles & carpet industry, flour mills, pulse and oil processing units, pulp and paper industries, plywood & wood products, tobacco products, chemical fertilizers, pesticides, leather goods, agro-machinery, and handicrafts are some of the industries which directly or indirectly depend on agriculture and allied sector. In addition to these agro-industries, the State also has various other industries, including thermal power plants, iron & steel industries, cement industry, heavy electrical, electronics & electric goods, chemical & petro-chemical products, stone crashing & sand mining, glassware, foundry, brassware, and lock making units. These industries are spread across the state, however, there are some industrial clusters famous for specific industries e.g., Bhadohi for carpet industry; Agra for foundry and leather products; Moradabad for brassware; Firozabad for glassware; Aligarh for locks; Meerut for sport goods; Kanpur for Textiles and leather goods; Lucknow for chikan works; and Saharanpur for wooden handicrafts. Most of the polluting industrial units, such as sugar, pulp& paper, distilleries, chemical fertilizer, leather goods and ternaries, oil refineries, etc., are located on the banks of river Ganga or its tributaries which release very polluting effluence into the river system.

10.1 Growth Trends in NSDP from Manufacturing and Tertiary Sectors

Figure 29 shows growth trends in the NSDP from manufacturing and tertiary sectors along with the growth in total NSDP of the State since 1950. It is evident from Figure 29 that average annual growth rates in manufacturing and tertiary sectors have increased significantly over the period. In the case of manufacturing, the annual growth rate went up from 3.5% during 1950-1970 to 5% during 1970-80 and further to 9.6% during 1980-90. However, during the ten year period from 1999 to 2008, it has drastically declined to 4.4% per annum. This clearly shows that during the post-economic reform period, manufacturing sector of the State has recorded poor performance vis-à-vis tertiary sector. Annual growth in the tertiary sector has increased from 2.8% during 1950-70 to 3.6% during 1970-80, 6.4% during 1980-90, and further to 9.5% during 1999-2008. Annual growth rate in NSDP (state income) has also gradually increased from a meager 2.2% during 1950-70 to 3.0% during 1970-80, 5.0% during 1980-90 and further to 7.7% during 1999-2008. It is significant to note that up to 1990 manufacturing sector led the growth in the State income, while during the last one decade it was the tertiary sector which led the growth.

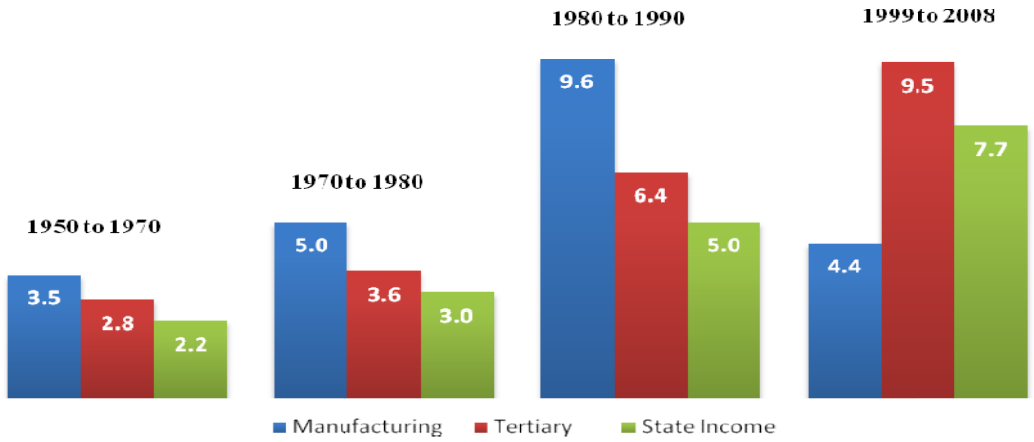


Figure 29: Average Annual Growth Rate (NSDP): Uttar Pradesh

10.2 Trends in Number of Industries, FC, Employment, Output and NVA

This section is based on the data collected from the Annual Survey of Industries (ASI), factory sector. The Growth of the industries has been analysed in terms of number of factories, fixed capital, value of output, employment, etc. The data have been collected for four time points, viz., 1980-81, 1990-91, 2000-01 and 2008-09. As shown in Table 14, number of factories in the State has increased from 7151 in 1980-81 to 10427 in 1990-91 and then decreased to 9635 in 2000-01. Thereafter, the number again went up to 10935 in 2008-09. Keeping in view the size of the State in terms of population, number of factories in the State appears to be relatively less. For instance in 2008-09, the State shares only about 7 percent of total factories of the country. Its percentage share in the total fixed capital (FC) invested in industries of India has significantly declined from 10.35 in 1980-81 to 8.70 in 2000-01 and further to 5.94 in 2008-09. State's shares in total number of employees and total number of workers have also declined over the period but relatively at a slower pace than the percentage share in the fixed capital. Similarly, the State's shares in India's gross output and NVA have also declined since 1990-91. Thus, during the last two decades, performance of industries (ASI factory sector) in the State has deteriorated vis-à-vis country as a whole. This implies that level of industrialization in some other states grew faster than Uttar Pradesh.

The study also estimated per factory number of workers, per worker FC, per factory FC, ratio of NVA to FC and per worker NVA. Per factory number of workers varies from 42 in 2000-01 to 86 in 1980-81 in Uttar Pradesh and from 47 in 2000-01 to 63 in 1980-81 at the all-India level. Per worker FC has been found to be slightly higher in the industries of Uttar Pradesh than the all-India level, except for the year 2008-09. NVA/FC is found to be higher in industries at the all-India level than the industries located in the State during all the years. Similar pattern is also observed in the case of NVA per worker. Thus, NVA per worker as well as per unit of FC are observed to be higher at the national level than the State of Uttar Pradesh.

Table 14: Trends in capital, employment, output, and NVA in Industries (factory sector) in Uttar Pradesh and India

Items	1980-81		1990-91		2000-01		2008-09	
	India	UP	India	UP	India	UP	India	UP
No. of factories	96502	7151 -7.41	110179	10417 -9.45	131268	9635 -7.34	155321	10935 -7.04
Fixed capital (In Rs. Crore)	29912	3096 -10.35	133648	14691 -10.99	399604	34775 -8.7	1055966	62677 -5.94
No of Employees (in 1000)	7744.72	770.63 -9.95	8162.5	789.01 -9.67	7917.81	535.74 -6.77	11252.79	738.64 -6.56
No. of Workers (in 1000)	6066.04	613.6 -10.12	6307.14	619.86 -9.83	6135.24	401.68 -6.55	8776.75	574.87 -6.55
Gross Output (Rs. Crore)	61308	3777 -6.16	270564	26368 -9.75	926902	64854 -7	3272798	200463 -6.13
NVA (Rs.crore)	12154	749 -6.16	51515	4625 -8.98	143621	9577 -6.67	527765	24139 -4.57
Workers/factory	63	86	57	60	47	42	57	53
FC/worker (Rs. lakhs)	0.49	0.5	2.12	2.37	6.51	8.66	12.03	10.9
FC/factory (Rs.crore)	0.31	0.43	1.21	1.41	3.04	3.61	6.8	5.73
NVA/FC	0.41	0.24	0.39	0.31	0.36	0.28	0.5	0.39
NVA/worker (Rs lakhs)	0.2	0.12	0.82	0.75	2.34	2.38	6.01	4.2

Note: Figures in parentheses are percentage share in India's total

Source: Compiled from ASI data

10.3 Regional Pattern of Industrialization

Figure 30 shows across UP region-wise number of industrial area per lakh population. Since the five regions of the State are different in their sizes the number of industrial areas has been standardized by dividing twith population. As is obvious from Figure 30, the number of industrial areas per lakh population has marginally increased from 0.12 in 2000-01 to 0.13 in 2009-10 in NUGP and from 0.05 to 0.07 in SUGP. It has remained same in CR and declined in SR and ER. Overall, the number of industrial areas per lakh population has marginally declined from 0.08 in 2000-01 to 0.07 in 2009-10 in the State. Thus, number of industrial areas in the upper Ganga plains has increased during the last one decade, while there has not been any increase in the other regions of the State.

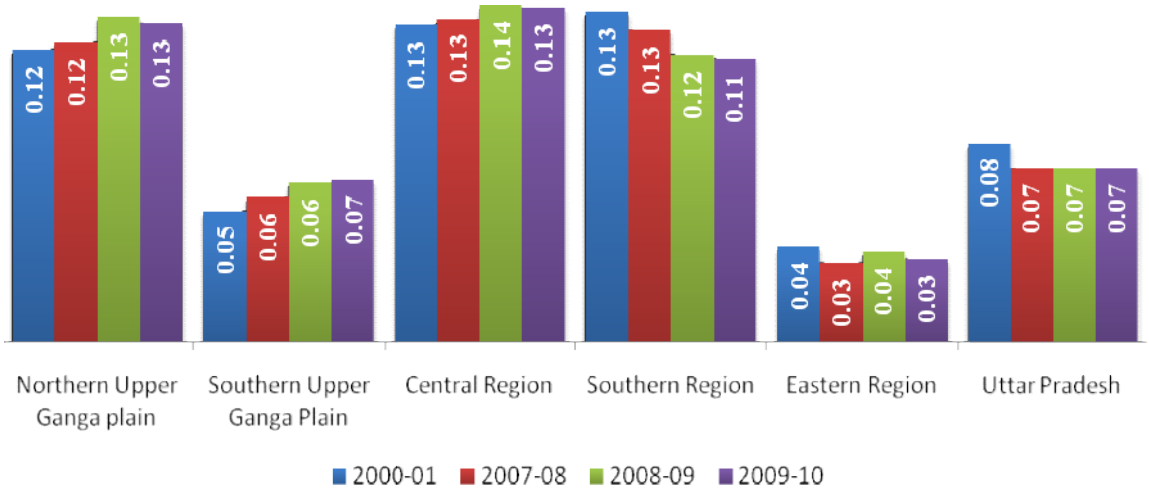
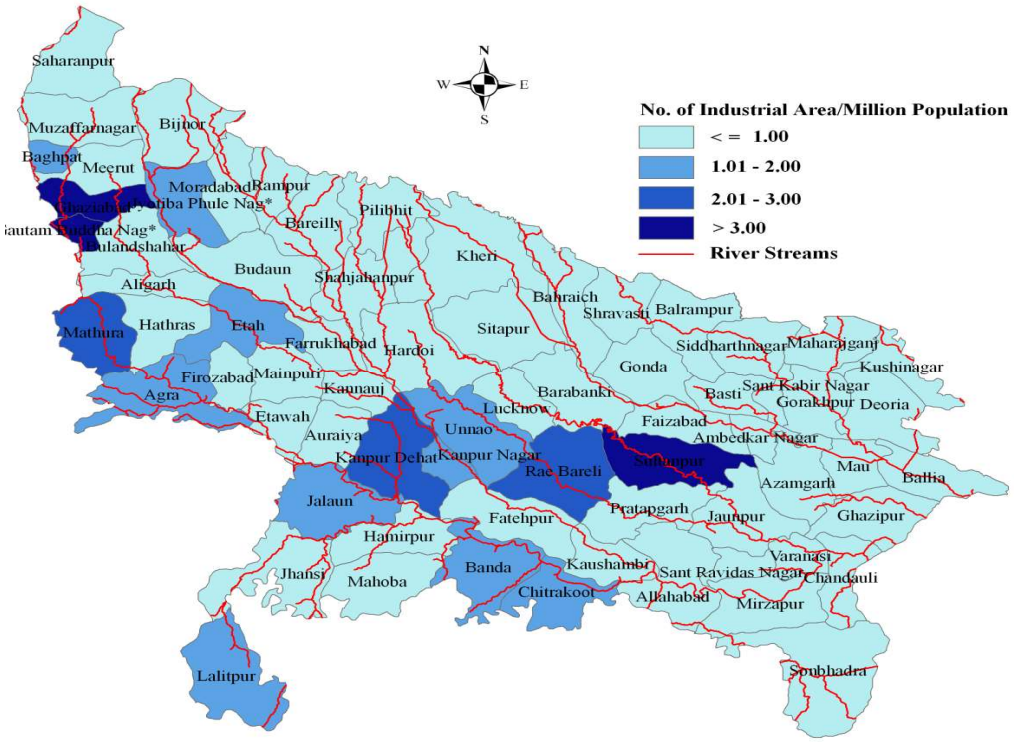


Figure 30: No. of Industrial areas per lakh population across various regions of Uttar Pradesh

District-wise number of industrial areas per lakh population is shown in Map-3. It is noted that in most of the districts of the State, the number of industrial areas per lakh population is less than or equal to one. Nine districts, namely, Baghpat, Moradabad, Etah, Agra, Lalitpur, Banda, Chitrakoot, Unnao, and Kanpur Nagar have number of industrial areas in the range of 1.01-2.0 per lakh population. Three districts, viz. Mathura, Kanpur Dehat and Rae Bareli have the number in the range of 2.01-3.0. Only Ghaziabad, Gautam Buth Nagar and Sultanpur have the number more than 3.0. Thus, in terms of number of industrial areas, there exists a wide disparity across the state.

UP has also witnessed rapid industrialization in the recent past, particularly after the initiation of economic liberalization policies in the country. As of 2002, there were 1498 heavy industrial units and 430,618 small industrial units employing 4,96,490 and 16,49,181 persons respectively. Regional distribution of heavy and small scale industries in the state (2002, 2005, and 2007) is presented in figure 31 which shows that the number of heavy industries in SUGP, SR and ER remained same, while it has increased significantly in NUGP during the same period. NUGP has highest number of heavy industries which is equal to all other regions of the state. SUGP and ER have more than 27 percent of the state SSI whereas NUGP and CR occupy 24 percent and 15 percent of state SSI respectively and SR lags behind with just 5 percent share.



Map 3: No. of Industrial areas per lakh population in Uttar Pradesh, 2009-10

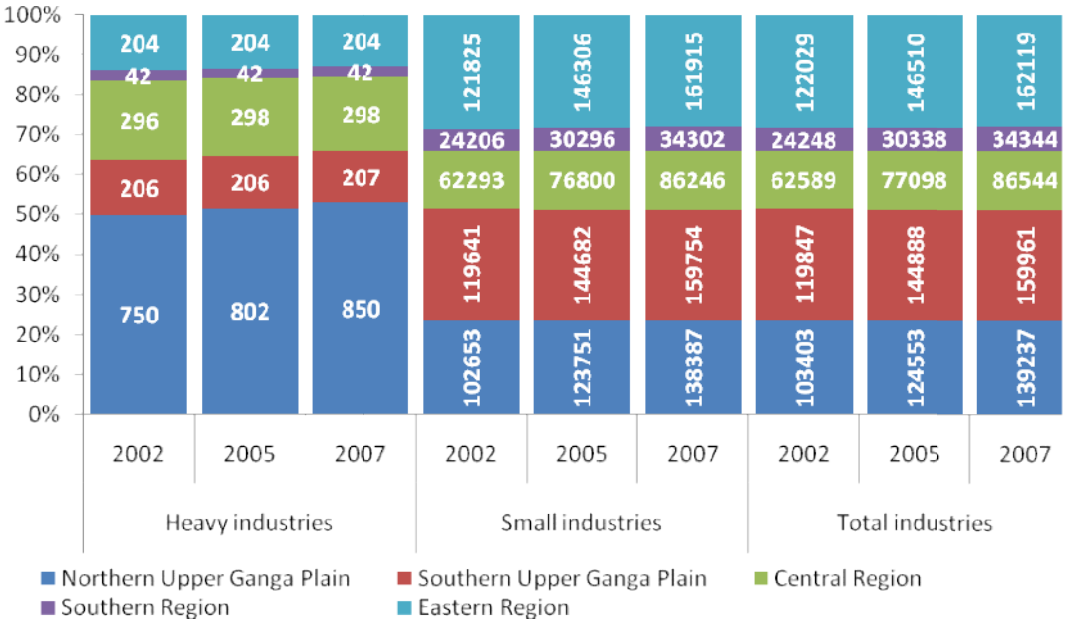


Figure 31: Number of Heavy and small Industries across various regions of Uttar Pradesh

As far as the number of SSI units per lakh population is concerned, Figure 32 shows that at the State level it remained more or less same between 2000-01 and 2009-10. However, there has been variation across regions. The number of SSI units in NUGP, SUGP, SR and ER has increased, while it has declined in the CR during the same period.

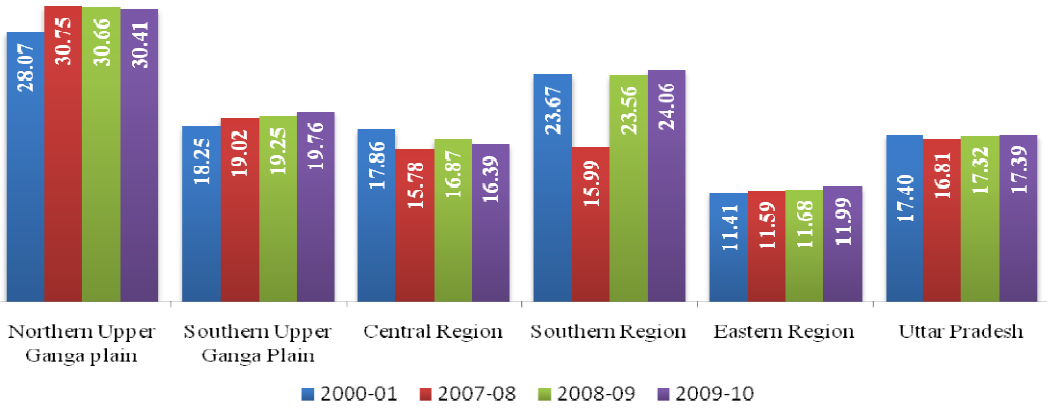
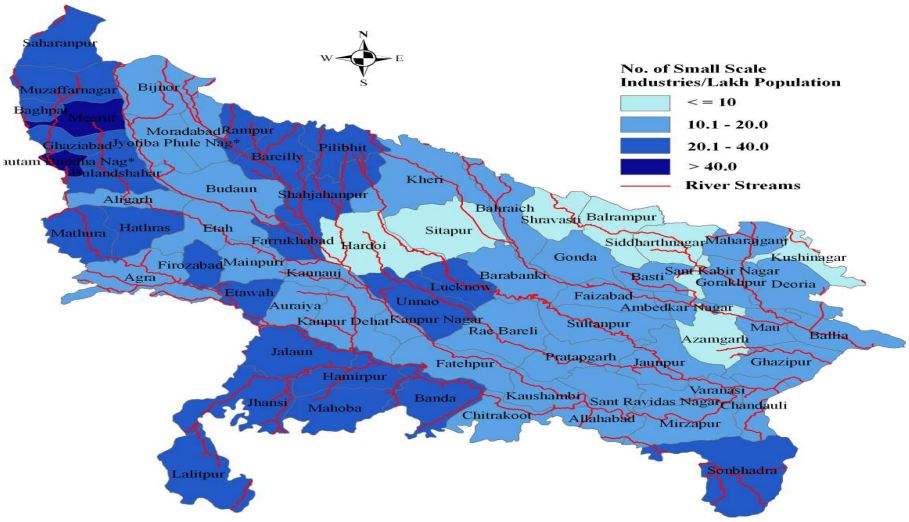


Figure 32: No. of small scale industries per lakh population across various regions of Uttar Pradesh

Map 4 shows the district-wise intensity of small scale industrial activity measured in terms of number of SSI units per lakh population in 2009-10. It shows that only 7 districts of the State have less than or equal to 10 SSI units per lakh population . A majority of districts score in the range of 10.01-20.0, most of which are found in the ER. About 30% districts of the State score in the range of 20.01-30. Only in two districts namely Meerut and Gautam Budh Nagar, it is more than 40 per lakh population. Thus, there exists not only the inter-regional variation in the concentration of SSI units but also intra-regional variation which can be attributed to resource availability, connectivity, infrastructure, etc.



Map 4: No. of small scale industries per lakh population in Uttar Pradesh, 2009-10

Figure 33 shows region-wise number of working factories per lakh population. It is significant to note that during 2000-01 to 2006-07, the number of factories per lakh population has declined in almost all the regions. At the State level, the number has declined from 6.7 in 2000-01 to 6.09 in 2006-07. Figure33 demonstrates that the maximum concentration of factories is in the Upper Ganga Plains (both Northern and Southern) followed by CR. In SR and ER, the number of factories per lakh population is less than 2.0; while in NUGP it was as high as 27.76 in 2000-01. These results

again testify to the fact that the level of industrialization is much higher in the NUGP than that in other regions of the state.

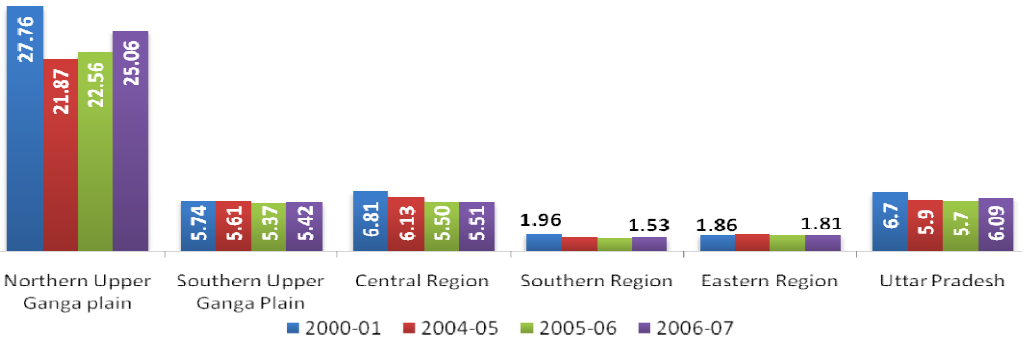


Figure 33: No. of working factories per lakh population across various regions of Uttar Pradesh

Observing the regional distribution of number of factories in the State, it can be seen that in 2000-01NUGP constituted highest share (47%) in the total registered factories of the State, followed by SUGP (21%). Thus, Upper Ganga Plains (Western Uttar Pradesh) is home to68 percent of total number of factories in 2000-01, while remaining three regions (CR, SR and ER) account for only 32% (Figure 34). In 2006-07, the percentage share of Upper Ganga Plains has further increased to 71%, while the corresponding share of remaining three regions has declined to 29% indicating that the highest concentration of industries in the State is in the NUGP, followed by SUGP and CR. The ER which has population and area almost equal to Upper Ganga plains (Northern plus Southern), shared only 11% of total factories in the State.

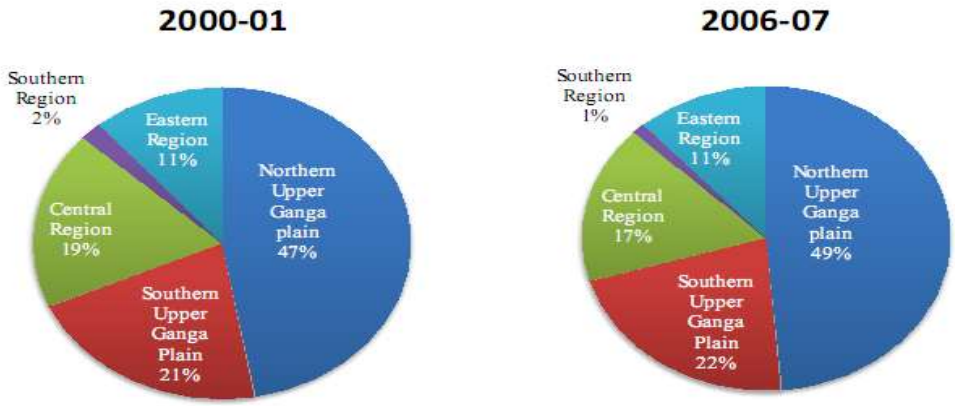
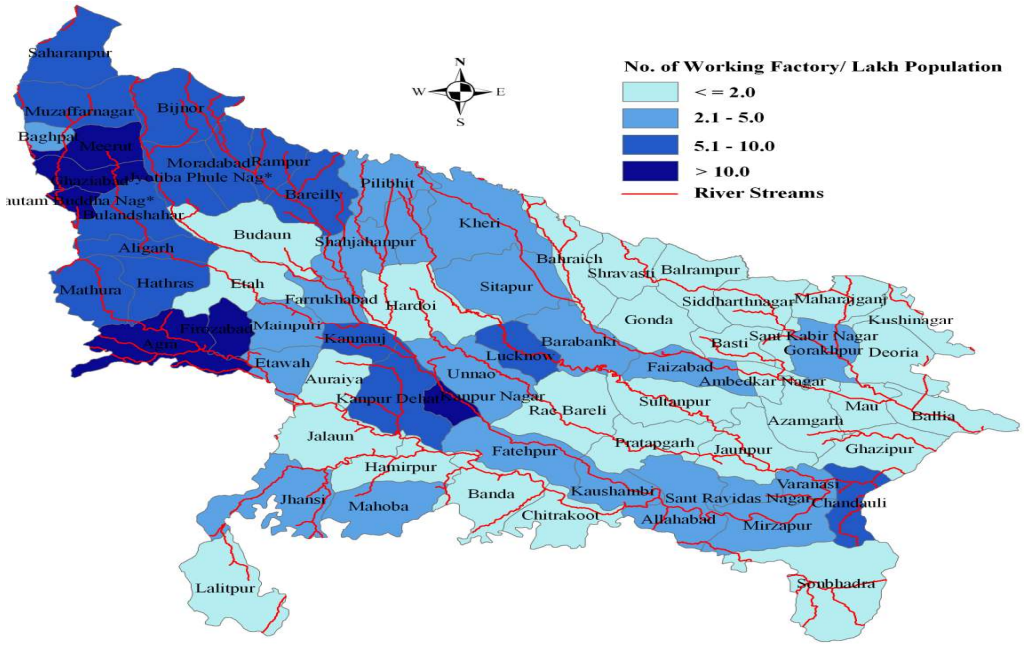


Figure 34: Percentage distribution of registered factories across various regions of Uttar Pradesh

Map 6 shows district-wise number of registered factories per lakh population. It is noted that most of the districts of ER and SR score 2, whereas most of the districts of NUGP and SUGP score more than 10.0. A perusal of the Map reveals that there exists a significant disparity in the level of industrialization across the state. For instance, Meerut, Ghaziabad, GautamBudh Nagar, Firozabad, Agra, and Kanpur Nagar have more than 10 factories per lakh population, while most of the districts located in ER and SR have less than or equal to 2 factories per lakh population.



Map 5: No. of working factories per lakh population, 2006-07

10.4. Value Added by Industries

In this section, region-wise per capita gross value added (GVA) in the industrial sector has been analysed. As noted from Figure 35 the per capita GVA has increased in all the regions during 2000-01 to 2006-07. At the State level, it has increased from Rs.3743 in 2000-01 to Rs.7653 in 2006-07. It is relevant to note that the per capita GVA has been highest in the NUGP. It is distantly followed by CR and SUGP while SR stands the lowest.

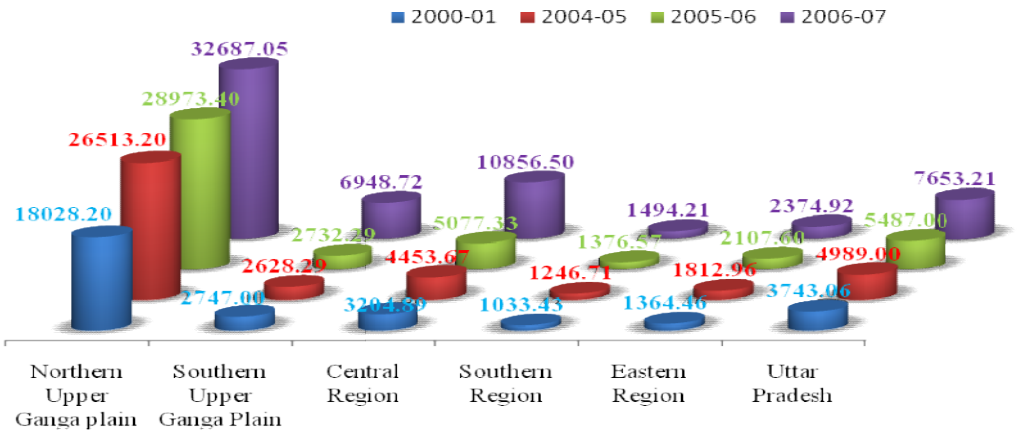
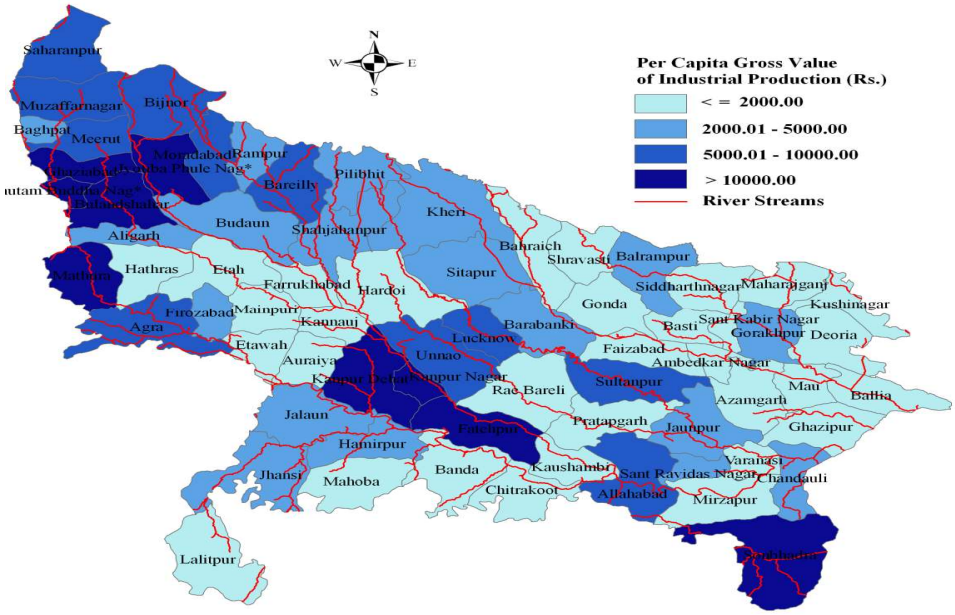


Figure 35: Per capita gross value of Industrial Production across various regions of Uttar Pradesh

Map 6 exhibits district-wise per capita GVA in the industrial secor in 2006-07 and it is found that there is wide disparity across districts. Most of the districts of ER, SR (and some districts of SUGP)

have shown value addition by industries of the order of or less than Rs.2000per capita, while most of the districts of SUGP have recorded value addition in the range of Rs. 5001-10000per capita . On the other hand highly industrialized districts such as Ghaziabad, Gautam Budh Nagar, Bulandshahr, Moradabad, Mathura, Kanpur, Fatehpur and Sonbhadra have reported value addition more than Rs.10,000per capita.



Map 6: Per Capita Gross Value of Industrial Production in Uttar Pradesh, 2006-07

If we measure the region-wise per worker NVA in registered factories, the results are found much different from that received in the case of per capita GVA. At the State level, per worker NVA has declined from Rs.4,13,410 in 2000-01 to Rs. 3,61380 in 2006-07. Out of the five regions, in three regions, viz., NUGP, CR and SR, per worker NVA in registered factories has declined in 2006-07 over 2000-01, while in SUGP and ER, it has increased. Figure 36 shows that per worker NVA varies significantly across regions and over the years.

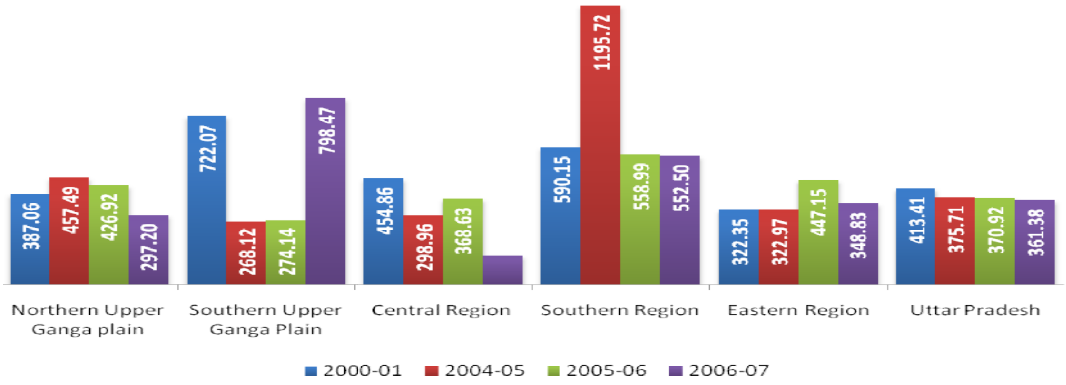
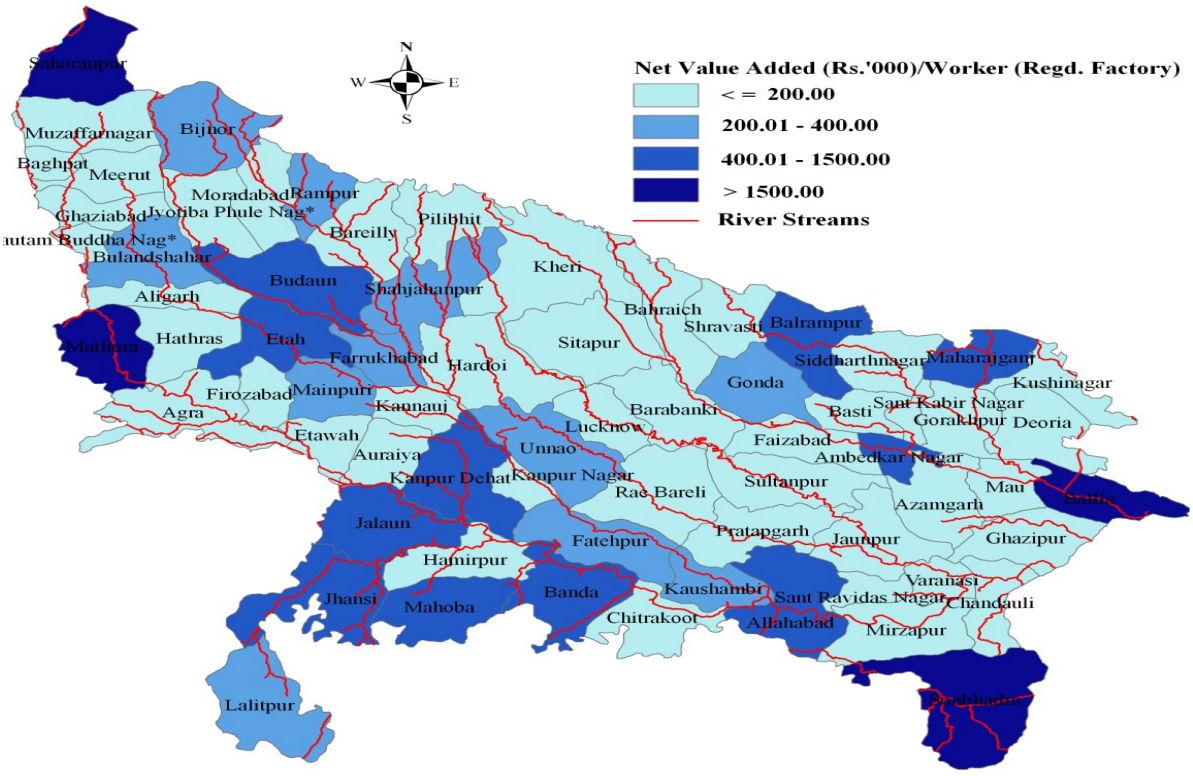


Figure 36: Net value added per worker in registered factories (000 Rs) across various regions of Uttar Pradesh

Map 7 presents district-wise per worker NVA in registered factories. It is found that about 60% districts of the State achieved per worker NVA less than or equal to Rs. 2,00,000. About one-sixth

districts of the State achieved per worker NVA in the range of Rs.200010 to 4,00,000 while in another one-sixth of the districts in the range of Rs.4,00,010 to 15,00,000. Interestingly in in four highly industrialized districts, namely, Saharanpur, Mathura, Sonbhadra and Balia, per worker NVA was recorded more than Rs.15,00,000. Evidently across districts thereis significant variation in per worker NVA in registered factories.



Map 7: Net value added per worker in registered factories (000 Rs) in Uttar Pradesh, 2006-07

Figure 37 presents information on region-wise investment (Rs. in cores) in heavy and small scale industries in Uttar Pradesh. As per this it is noted that during 2002-200775-80 percent of investment in the state is accounted by heavy industries. In this category NUGP attracted one third while SUGP and ER received about a quarter each whereas CR and SR were not so successful. Similar trend is found in SSI investment.

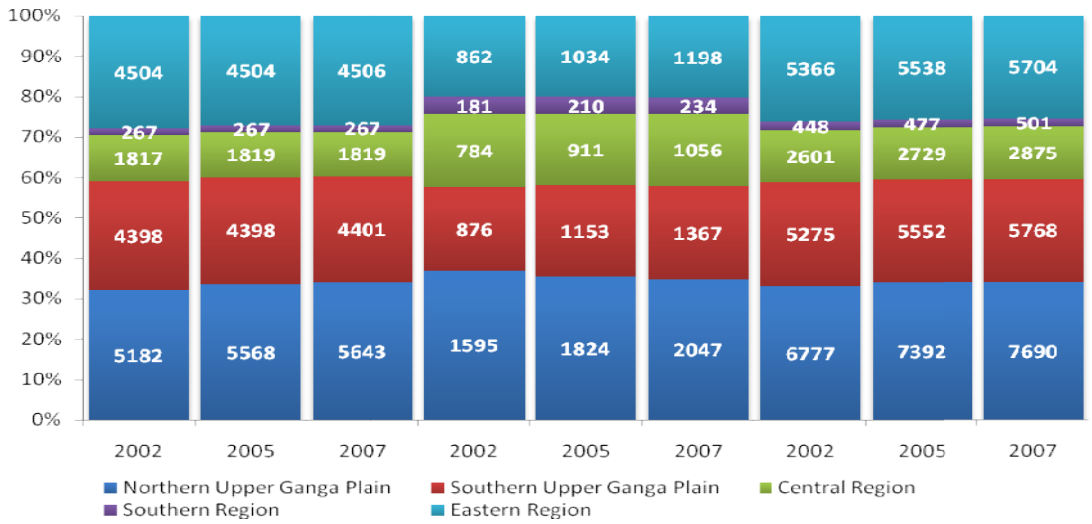


Table 37: Investment (Rs. in Crore) in Heavy and Small Scale Industries in Uttar Pradesh

10.5. Regional Trends in Employment Generation in the Industries

This section deals with regional trends in employment generation in the industrial sectorof the State. Figure 38 shows number of employees in registered factories per lakh population. At the State level, number of employees per lakh population has increased from 228 in 2000-01 to 373 in 2006-07, a net increase of 24 per lakh population per year in these six years. A region-wise comparison of employment generation in factories reveals that NUGP has the highest number of employees per lakh population. It is distantly followed by SUGP and CR. SR has the lowest number of employees per lakh population, followed by ER. A perusal of Figure 38 reveals that there has been tremendous rise in the number of employees in the NUGP. The number has increased from 861.6 to 1745.9 per lakh population over six years period from 2000-01 to 2006-07, a net increase of 147 per lakh population per year. Evidently NUGP outperformed other regions. Though number of employees per lakh population has also increased in other regions, the rate of increase was much lower than that observed in NUGP. This implies that concentration of industries is highest in NUGP. This also correlates with high discharge of industrial effluent and sewage from urban population into the river system.

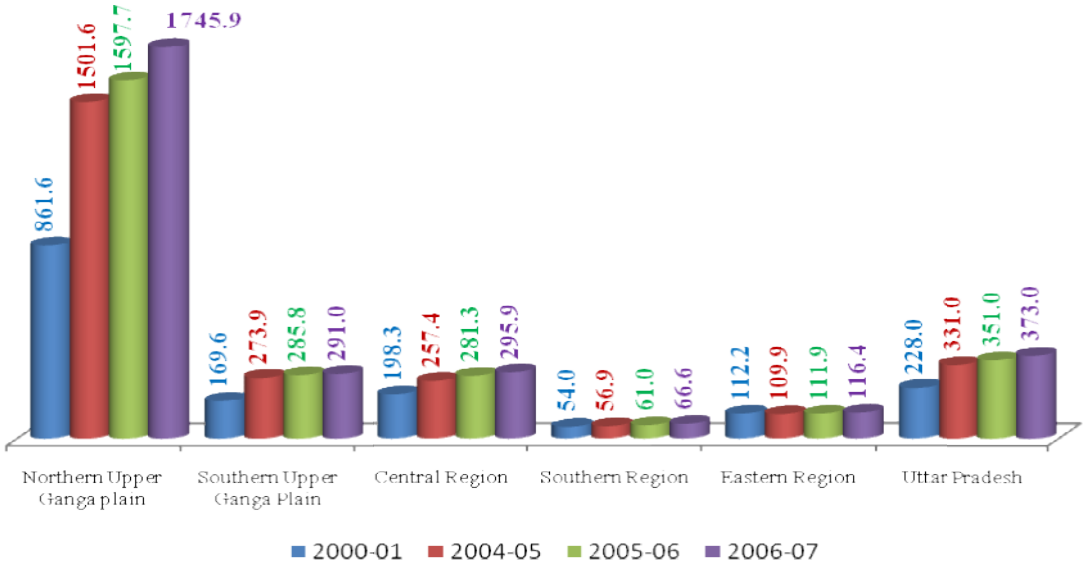
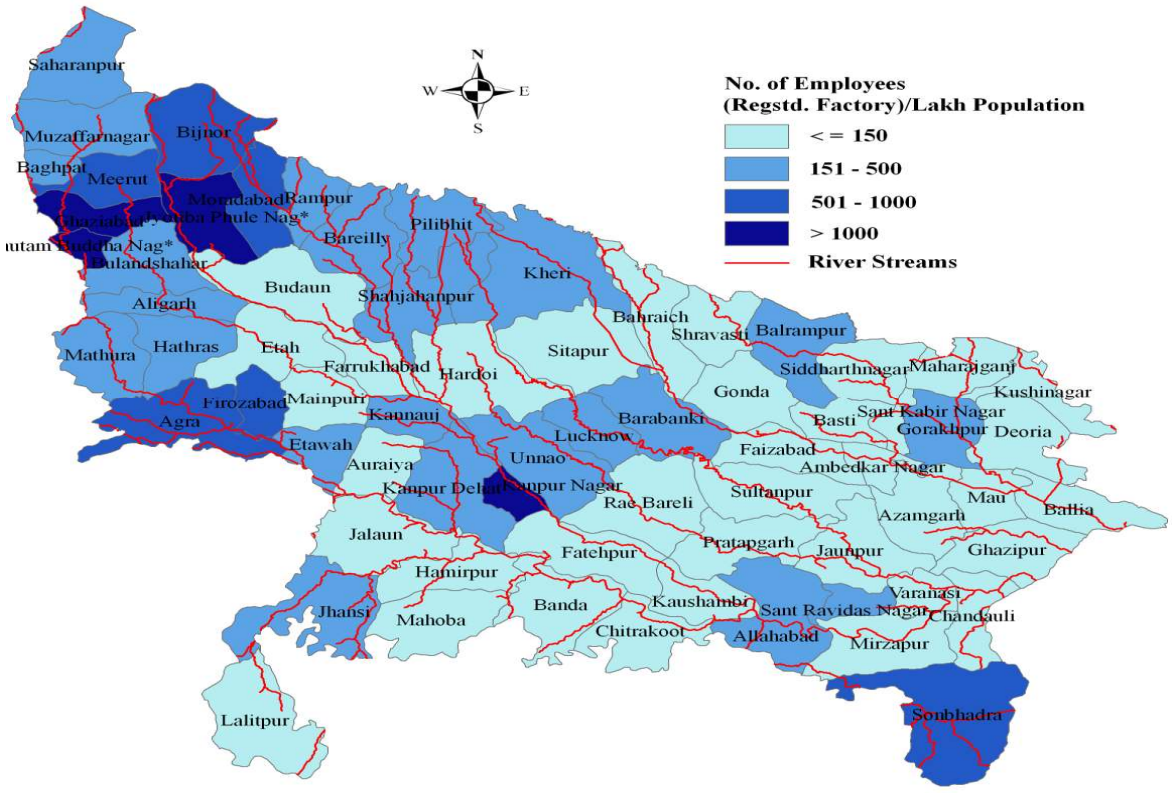


Figure 38: Number of employees in registered factories per lakh of population across various regions of Uttar Pradesh

Inter-district variation in number of employees is shown in Map 8 which brings to the fore that about 50% districts of the State have less than or equal to 150 employees per lakh population . Most of these districts are in ER, SR and CR. For another one-third districts this is reported in the range of 151-500 employees per lakh population. Except for Sonbhadra in ER, no other district of ER, CR and SR has 501-1000employees per lakh population, while registered factories in several districts of NUGP and SUGP have number of employees in that range. Four districts, namely, Ghaziabad, Gautam Budh Nagar, Moradabad and Kanpur Nagar have more than 1000 employees per lakh population. These findings again bear witness that districts located in North Upper Ganga Plain have highest level of industrialization among all regions of the State.

In order to understand variation in average size of registered factories across regions, number of workers per registered factory has been estimated. Figure 39 shows that average size of factory in terms of employment has increased in all the regions in 2006-07 over 2000-01. At the State level, the number of workers has increased from 25.7 in 2000-01 to 47.58 in 2006-07. Across regions it is found that it was highest in ER, followed by NUGP. In the ER, the number has increased from 68.37 in 2000-01 to 90.33 in 2006-07. Similarly, in the case of NUGP it has increased from 47.46 in 2000-01 to 62.65 in 2006-01. It can be inferred from the perusal of Figure 33 that although the level of industrialization in the ER is lowest among all the regions, average size of factory is largest, whereas in NUGP the level of industrialization is highest but average size of factory is lower than that in the ER.



Map 8: **Number of employees in registered factories per lakh of population in Uttar Pradesh, 2006-07**

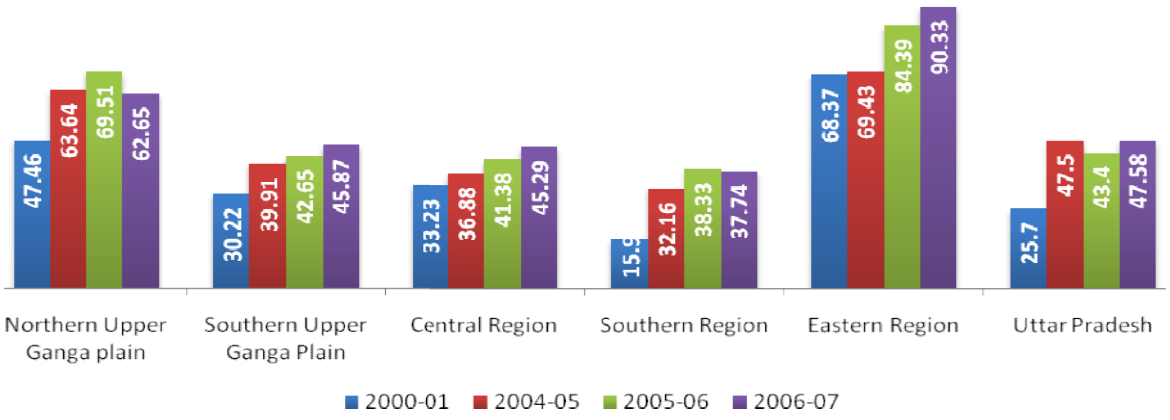


Figure 39: **Average workers per registered working factory across various regions of Uttar Pradesh**

A region-wise comparison of employment generation in heavy industries is presented in Figure 40 which reveals that NUGP has the highest proportion of employees. It is distantly followed by CR and ER. SR has the lowest percentage of employees. In SSI sector, SUGP has the highest proportion of employees, followed by NUGP and ER respectively and SR has the lowest percentage of

employees. As far as growth of employment opportunities is concerned (heavy and small industries), NUGP region outperformed other regions.

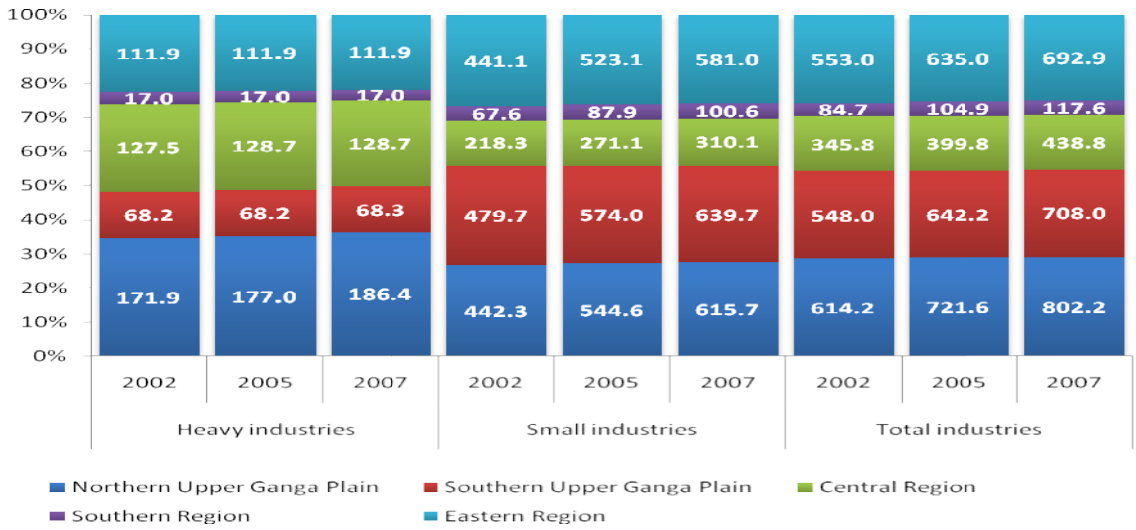


Figure 40: Region-wise Persons Employed in Heavy and Small Scale Industries in Uttar Pradesh

11.0. Sources of Pollution in the River Ganga

Urbanization, industrialization and chemicalization of agriculture are the main sources of river pollution These sources can be classified as point and non-point sources. Point sources include domestic sewage and industrial effluent discharges, while non-point sources comprise, among others, run off from agriculture fields carrying pesticides and chemical fertilizer. Heavy doses of pesticides and chemical fertilizers used in agriculture not only pollute groundwater but also lead to severe pollution of rivers and other surface water bodies. In this section, only point sources of pollution are discussed. As stated earlier, the State of Uttar Pradesh has more than 700 cities and towns with approximately 2 crores (62%)of urban population in Class I cities;35 lakhs (10%) in Class II cities;50 lakhs (15%) in Class-III cities and 46 lakhs (13%) in smaller towns from Class- IV to VI in 2001, generating about4845MLD sewage while sewage treatment facility is restricted to mainly new cities and that too is quite inadequate. Moreover, sewage volumes in some cities and towns of religious and cultural importance increases significantly during festivals, cultural and religious congregations, which is not property treated and consequently pollute the Ganga. It is estimated that municipal sewage contributes about 80% by volume of the total waste water disposed of into the Ganga and the industries contribute about 15%. Over the period, urban population has increased substantially, while the municipal infrastructure for sewage disposal has remained inadequate. In this section, only two major sources of pollution of river Ganga, namely, urban domestic sewage and industrial effluent have been discussed.

11.1 Urban Sewage

As stated earlier, most of the cities in the State are located on the bank of river Ganga or its tributaries. Except for a few Class I cities, in most of the cases, sewage treatments plants have not yet been installed by the urban local bodies. Even in those cities where sewage treatment facilities are available, the facilities are inadequate and ill-equipped in treating the ever increasing wastewater flows. Table 15 presents details of sewage generated in some cities and available treatment capacity of STPs.

Table 15: Waste water Generation and Treatment in Uttar Pradesh

S. No.	City/Town	Population 2001	Total Sewage generation (in MLD)	Treatment Capacity (in MLD)	Percentage covered
Class I					
1	Kanpur	3114530	339.3	171.1	50
2	Varanasi	1353920	187.1	141	75
3	Allahabad	1218070	208	89	43
4	Farrukhabad-cum-Fatehgarh	280290	30.5	8.3	27
5	Mirzapur-Vindhyachal	252470	27.5	14	51
6	Unnao	178250	23.9	19.4	81
7	Ballia	125740	18	-	0
8	Dehradun	550800	76.1	-	0
9	Hardwar	215260	39.6	18	45
Class II					
10	Bijnor	79368	7.6	8.1	100
11	Mughalsarai	88386	16	-	0
12	Ghazipur	95243	10.7	-	0
13	Kannauj	71530	7	-	0
14	Deoband	81706	7.8	-	0
15	Gangaghat	70817	6.8	-	0
16	Rishikesh	59671	10.7	6.3	59
17	Roorkee	97064	11	-	0

Source: TERI (2011)

It is noted that except for Noida which has 100 treatment capacity, the percentage of sewage treatment is quite low in all other cities and towns. Allahabad and Varanasi, both being important centres of pilgrimage, have grossly inadequate installed capacity – around 30% of its present sewage flows.

Figure 41 shows that about 36% of Class-I and 70% of Class-II cities of undivided Uttar Pradesh are located on the bank of River Ganga. Further, 27% class-I and 27% class-II cities are located on the bank of tributaries of the river Ganga. Thus, about 63% Class-I cities and 97% of Class-II cities of the state are in one way or another discharge their wastewater into the river system leading ultimately to tha Gang.

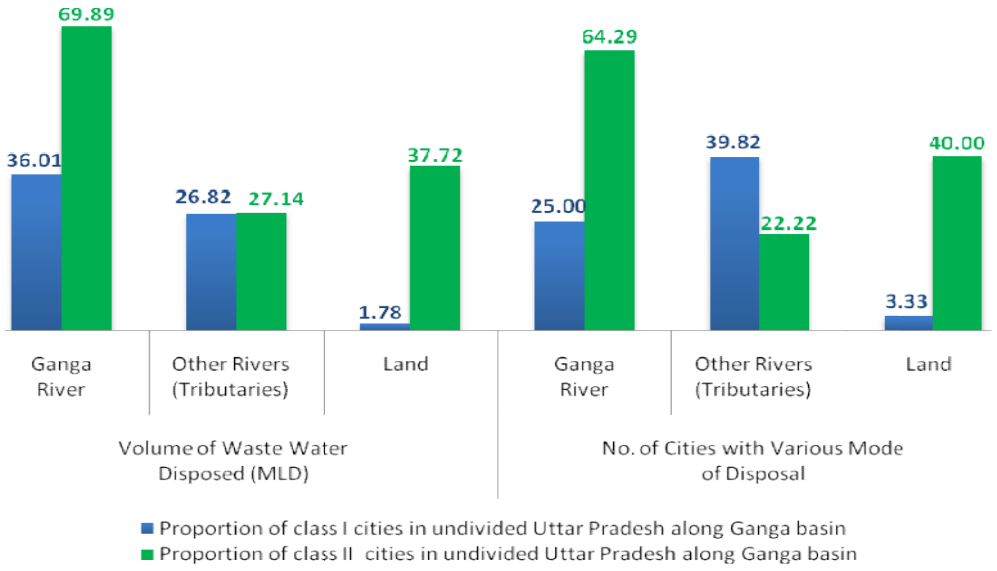


Figure 41: Percentage of Municipal Wastewater Disposal and Mode of Disposal in the Ganga Basin (Uttar Pradesh and Uttarakhand)

Figure 42 brings out the serious shortfall in sewage treatment capacity in Class-I cities of UP. This situation needs to be corrected on priority if the quality of the holy rive has to be restored in a reasonable time frame.

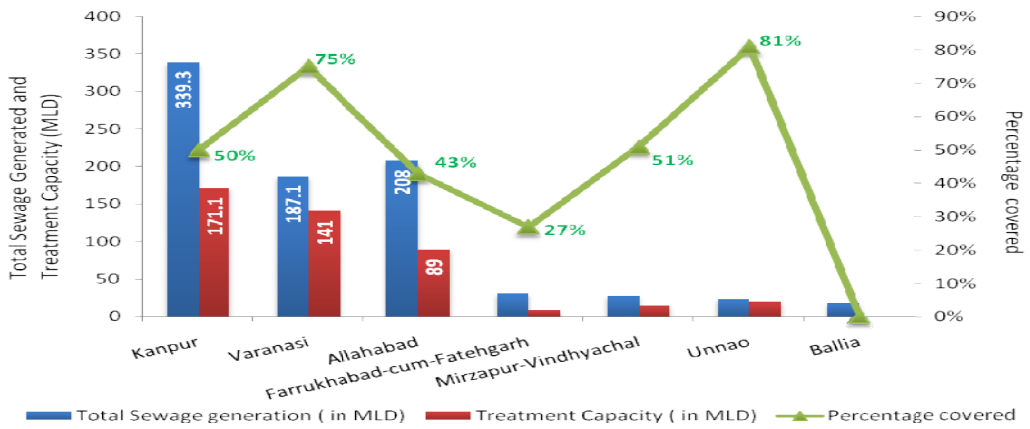


Figure 42: Wastewater Generation and Treatment Capacity for Class I cities discharging wastewater into the Ganga River

Further, the most common observation about the installed sewage treatment plant is that most of them either don't work or underperform. When it comes to Class II cities the scenario is far worse. In this category, as shown in Figure 43except for Bijnore where installed treatment capacity is adequate for the time being, all other cities do not have any treatment plant at all, while sewage volumes are fairly large. .

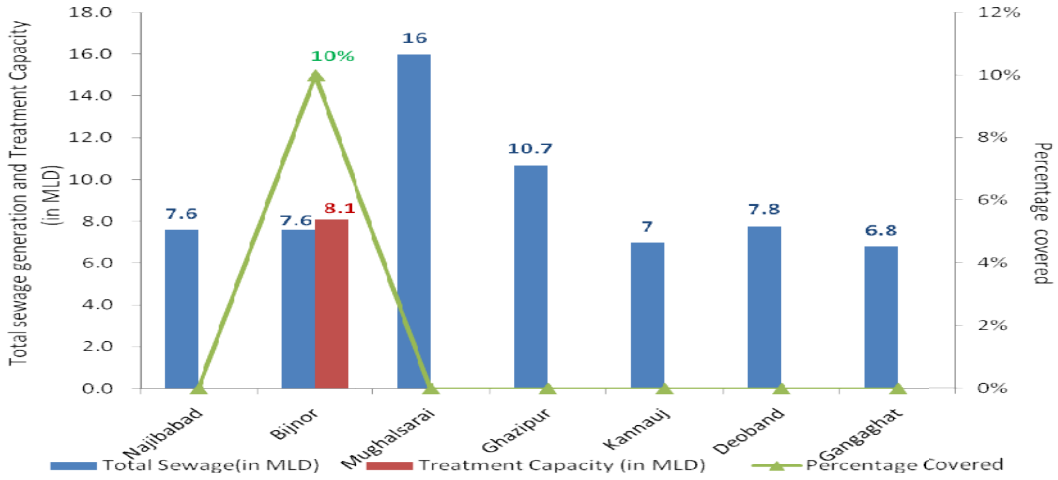


Figure 43: Wastewater Generation and Treatment Capacity for Class II cities discharging wastewater into the Ganga River

Figure 44 presents scenario of solid waste quantity and generation rate in the backdrop of population density in Class I cities of Allahabad, Kanpur and Varanasi. In relation to the waste loads, these cities do not have the required capacity for collection, transport, treatment and safe disposal. As a result, a large quantity of MSW is eventually disposed of in unsafe manner, leading to pollution in the river system either directly or through release of leachate.

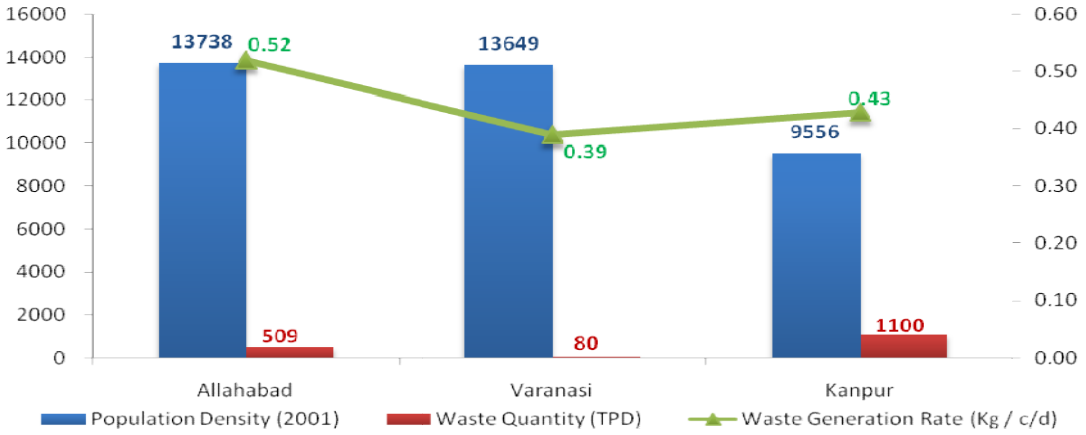


Figure 44: Waste Generation and Status of Implementation of MSW (Management & Handling) Rules, 2000 in Uttar Pradesh Cities along River Ganga

11.2. Industrial Effluents

Table 16 shows list of polluting industries in some important districts in the state. Most of these industries are located onthe bank of river Ganga or its tributaries. Treated or untreated effluents of these industries are released into the river, thereby increasing pollution load and adversely affecting the carrying capacity of river system.

Table 16: List of type of Industries contributing to pollution in Uttar Pradesh

District	Type of Industries
Lucknow	Distillery, Brewery, Iron & Steel including foundries, Rolling & Pickling, Casting, Pesticides, Chemicals, Asbestos, Cement, Electronics, Silicates, Timber
Varanasi	Food Products, Tobacco and Tobacco Products, Silk, Textile Products, Wood Products, Leather Products, Rubber, Petrochemical Products, Non metallic and Mineral, Basic Metal & Alloy Industries, Metal Products & parts, Machinery & Machine Tools.
Kanpur	Cotton Textiles, Leather Industry, Jute Mills, Woollen Mills, Edible Oil Industries, Chemicals and Chemical Products, Basic Ferrous Industries, Manufacture of Non-Electrical Machinery
Ghaziabad	Heavy & Medium Industries, Small Scale Industries, Handicraft, Rural Industries
Agra	Foundry, Glass Industries, Lime Kiln, Silicates, Refractory, Eriquette, Rubber Industries, Leather industries
Jhansi	Thermal Power Plant, Heavy Electricals, Fertilizers, mostly stone based industries, Handicraft

Source: District Industrial Development Centres,.

Table 17 shows that number of most polluting industries in the State has increased from 207 in 2000 to 390 in 2010. As far as number of industries that comply with pollution control norms it is noted that there is an increase from 198 in 2000 to 281 in 2010. Evidently 20% industries still not comply and which must be contributing to the pollution load on the river system.

Table 17: Pollution Control in 17 Categories of Highly Polluted Industries in Uttar Pradesh and India

Year	Uttar Pradesh				India			
	Total No of Units	closed	complying	defaulter	Total No of Units	closed	complying	defaulter
2000	207	14	198	5	1551	114	1326	53
2010	390	38	281	71	2608	339	1924	345

Source: Annual Report of MOEF

Figure 45 shows distribution of industrial hazardous wastes among districts along river Ganga. In the case of land disposable hazardous waste two districts of Kanpur and Kanpur Dehat alone account for more than 82 percent of the total waste in the state;, while in the case of incinerable hazardous waste, the district of Raebareli alone accounts for 77% of the total waste in the state and Kanpur and Kanpur Dehat come a distant second at around 20%.

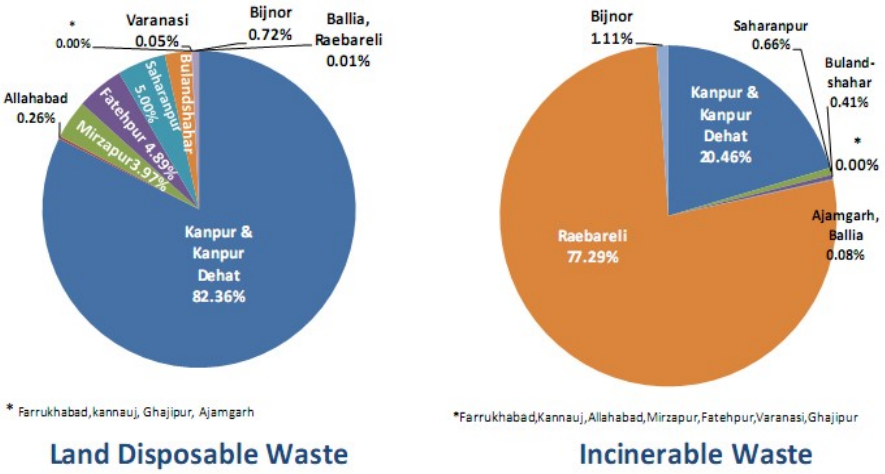


Figure 45: Hazardous Waste from Industries in Uttar Pradesh along River Ganga (a)

Figure 46 shows share of different cities in recyclable and total wastes of industries. In the case of recycle wastes, Saharanpur constitutes 54% of such wastes. It is followed by Fatehpur (38.73%) and Allahabad (10.57%). In the case of total industrial waste, more than one third is shared by Saharanpur. Fatehpur comprises 29% of total wastes, followed by Kanpur and Kanpur Dehat (21%) and Allahabad (7.66%). The Figure clearly indicates that while the share of Kanpur and Kanpur Dehat in the recyclable industrial waste is almost zero, the non-recyclable waste is quite substantial.

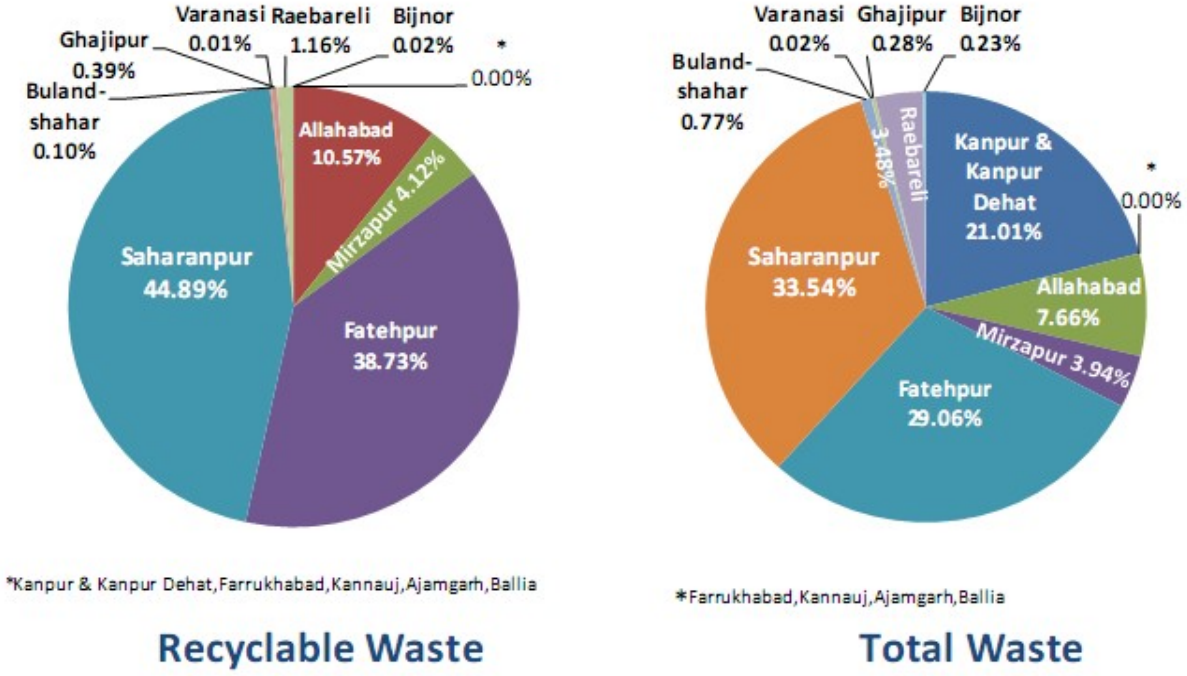


Figure 46: Hazardous Waste from Industries in Uttar Pradesh along River Ganga (b)

Figure 47 shows four kinds of wastes in Uttar Pradesh and the whole Ganga Basin. In the case of land disposable waste, Uttar Pradesh shares about 32% of total waste, while its share in the

incinerable waste category is only about 12 %. More than 98 % of recyclable industrial waste in the Ganga Basin is generated only in Uttar Pradesh. This implies that policy focus must be given on making efficient use of recyclable industrial wastes in the state. As far as disposable of incinerable waste is concerned, it is imperative to explore robust technologies such that this category of waste can be safely disposed of without putting more pressure on land resource and without causing any problem of air pollution.

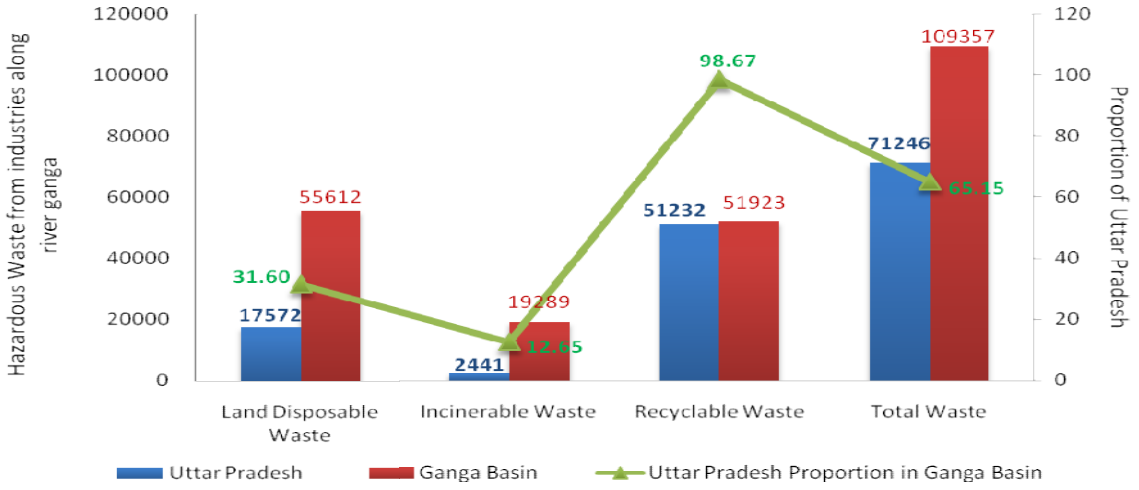


Figure 47: Hazardous Waste from Industries in Uttar Pradesh along River Ganga and Total Ganga Basin

All these statistics clearly indicate that the river has to carry a considerable amount of raw and diluted sewage created and discharged by the urban and industrial centres downstream which severely impair the quality of water affecting human, plants and river ecosystem adversely. The effect becomes far more glaring in view of the fact that a large amount of water stand already withdrawn from the Ganges and its tributaries in the upstream areas that far more limit their capacities, especially downstream, to carry and clean the water through natural process. The effects of disposal of raw sewage into the river system are well documented in the scientific literature and therefore need no further emphasis.

12.0. Conclusions and Policy Implications

The above analysis takes stock of urbanization and industrialization pattern in the State of Uttar Pradesh, so as to find out the areas which could be addressed through appropriate interventions. The analysis has been done at the state, region and district levels. From the analysis and interpretation of data, the following conclusions emerge:

- The percentage of urbanization in Uttar Pradesh has been much lower than the national average. Despite low urbanization, the state is characterized by wide variations in the level of urbanization across districts and regions. Relatively higher level of urbanization in districts, such as Meerut, Ghaziabad, Gautam Budh Nagar, Aligarh, Agra, Kanpur,

Allahabad, and Varanasi have greater implications for Ganga river. NUGP has the highest percentage of urbanization in the state, followed by SUGP and CR. The Upper Ganga Plains, which constitute 39.2% of total population and 53.4% of total urban population of the State, have the largest number of towns (344 towns) in the State. It implies that the policy focus of pollution reduction in the Ganga river must be more on the Upper Ganga Plains, followed by the Central Region for the reasons given below:

  - Cities located in the Upper Ganga Plains grew faster than the cities of other regions.
  - The growth of Class-I and Class-II is relatively higher in Upper Ganga Plain than the other regions.

- During the last 10 years (2001-2011), number of urban households grew much faster than the total number of households in the State.

- Urbanization has increased faster in NUGP and CR than the other regions.

- About one third of Class-I and two thirdof Class-II cities of Uttar Pradesh are located on the bank of River Ganga. Further, about a quarter of class-I and class-II cities each are located on the bank of tributaries of the river Ganga. A majority of these cities do not have sewage treatment facility and where they exist, typically there are problems of poor performance. The scenario is far worse when it comes to the class II cities, where sewage generation and disposal is quite sizable, the facility almost remain non-existent.

- In selected large cities slum population is almost one third of the total population which has implications of open defecation and quality of environment, river ecosystem and public health.

- The study finds that about 38% rural households and 6.64% urban households in the State in 2011 did not have any sewerage connection . However, the percentage of households having closed drainage system has increased from 26.46% in 2001 to 32.18% in 2011 in urban areas and from 5.29 to 7.23 in rural areas. An increase in the share of closed drainage system in the total indicates some improvement in sewerage system in the State. However, the extent of improvement varies significantly across region.

- Tap water continues to remain the key source of water supply to the urban households in all the regions. Next to tap water is hand pump. Its percentage share in the sources of drinking water has declined in the Upper Ganga Plains and increased in all other regions.

- Average MPCE in urban areas has been much higher than that in the rural areas. Further, an average consumer in urban areas spent about 60% of its total MPCE on non-food items, whereas its counterpart in rural areas spent only about 40% of total MPCE on non-food items. The percentage share of food items in the total MPCE has been continuously declining in both the rural and urban areas

- On an average, per capita calories and protein intakes in rural and urban areas have declined, while the per capita intake of fats has increased in both Uttar Pradesh and India. The share of food grains (cereals plus pulses) in the total protein intake has declined during the last 15 years, while that of other food items has increased during the same period. The shares of milk & milk products and meat, fish & eggs have remained more or less stable since 1999-00.

- A decline in the share of regular employment in 2009-10 is a serious issue which implies that the fast growth of the formal economy could not generate adequate regular employment for the workforce. During the last five years, regular and self-employment has declined, whereas casual employment has increased, indicating deterioration in quality of employment in urban areas.

- The rural-urban migration rates are found highest in economically backward region viz., SR, followed by CR and ER. However, increase in the migration rate is observed highest in NUGP, followed by SUGP. The high intensity of rural-urban migration in SR is largely driven by distress factors, while increase in the rural-urban migration rate in the Upper Ganga Plains is mainly due to growth induced factors.

- Most of the polluting industrial units are located on the banks of river Ganga or its tributaries and discharge untreated effluents into the river system, affecting its water quality and the ecosystem .

- Concentration of industries is highest in the Upper Ganga Plains and consequently the high level of industrial effluents and urban sewage released into the rivers has polluted the river ecosystem.

All the above conclusions amply indicate that the river has to carry a considerable amount of raw and diluted sewage created and discharged by the urban and industrial centres downstream which severely impair the quality of water adversely affecting human, plants and river ecosystem. The effect becomes far more glaring in view of the fact that a large amount of water stand already withdrawn from the Ganges and its tributaries in the upstream areas that has affected the water flows in the river and the assimilative capacity of river ecosystem.

Increasing urbanization and industrialization do affect the economic, social and health aspects of communities, besides affecting the socio-cultural fabric of the people. Increasing economic and educational opportunities in the urban areas, coupled with more or less stagnant agriculture, rural to urban migration is certainly going to grow at a faster rate which may see a total transformation of the rural and urban scene whereby while the class II cities shall get transformed into Class I and the latter going for further expansion at a faster rate, class III and class IV cities moving upward in terms of status and further emergence of new class IV and below this category towns. All these developments may lead to a further concentration of population in these expanding and emerging urban centres putting a further stress on the urban infrastructure, creating more sewage and non-sewage waste loads to be finally discharged into already burdened river system, if no viable

alternative option to the dumping and treatment of this waste is evolved. Industrialization may also grow at a faster rate, with some push from the government, with the objective of expanding the employment base of the state. Given the water and other needs of the growing towns, most of these developments may take place closer to the banks of river Ganga or its tributaries. Given the fact that municipal sewage contributes about 80% by volume of the total waste dumped into the Ganga and the industries contribute about 15%; and that about 36% of Class-I and 70% of Class-II cities of the State are located on the banks of River Ganga and further, about a quarter of class-I and class-II cities each are located on the bank of its tributaries, the situation has serious implications for the future of the river itself let alone preserving its spiritual and environmental values.

Most of the effluents that emanate from industries in the Upper Ganga Plains and the Central Region are highly polluting in nature. They are resulting from wide range of industries e.g., leather and leather products, distillery and breweries, chemicals, sugar, pulp & paper, metals and metal products, textiles, fertilizers etc. It is recognized that a number of such industries are not resorting to proper treatment of effluent. While the load on the river may increase as a result of generation and dumping of fast growing raw, under-treated and treated municipal waste and the industrial effluent and other pollutant discharge, the amount of water available in the river may deplete for the fact that the demand for river/ground water for agriculture may further grow. Given the current state of stagnation of agriculture sector and the need to produce more food, it necessitates initiation of fresh medium and large-scale irrigation schemes in the state, may lead to the increased diversion of water from Ganga and its tributaries. The demand for hydropower (cheaper mode of generating power) for sustaining and further promoting the developmental activities may also see construction of dams for hydropower development in the State which may alter the water flow system in the Ganga basin during the monsoon and dry seasons. Further the demand for water for household and industrial consumption may keep on growing with the faster pace of urbanization and industrialization. All these may have profound impact on the socio-economic and cultural aspects of many people who are directly or indirectly dependent on Ganga for their livelihood.

The above discussion points to the need for redefining priorities, so that tangible results could be achieved in the short-term. Given the fact that the level of urbanization and industrialization is most fast paced in the NUGP followed by SUGP and CR, treatment and safe disposal of municipal solid waste, sewage and industrial effluents are far more pressing in these ever expanding regions. These are also places where most of the religious rites are performed and congregations such as Kumbh Melas are organized. Thus, theneed to put in place a robust and reliable waste disposable system, which encompasses both the municipal and industrial wastes is most pressing. These systems may not necessarily be drawn keeping in view the export of final discharge into the Ganga river system but may be designed based upon the two fundamental principles: first, zero discharge into the river system, and second, recycling of waste water and solids for productive uses.

Since urbanization and industrialization are highly inter-related phenomenon, a high level of urbanization in the Upper Ganga Plains and the Central Region of the State also has a high

concentration of industries, thereby generating high level of pollution. This suggests that for maintaining the wholesomeness of River Ganga, emphasis of the GRBMP should be more on these regions of the State.

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Appendix

Table A.1: Trend of Population and Urbanisation in Uttar Pradesh

Year	Population (Crore)			Population (%)		Decadal Variation (Crore)	Growth Rate of Urban Population	No. of Uas and Towns
	Total	Rural	Urban	Rural	Urban			
1901	4.86	4.33	0.54	88.94	11.06	---	---	349
1911	4.82	4.33	0.49	89.82	10.18	-0.05	-8.87	350
1921	4.67	4.18	0.49	89.46	10.54	-0.15	0.41	367
1931	4.98	4.42	0.56	88.85	11.15	0.31	12.81	375
1941	5.65	4.95	0.7	87.58	12.42	0.68	26.47	385
1951	6.32	5.46	0.86	86.36	13.64	0.67	22.87	410
1961	7.38	6.43	0.95	87.15	12.85	1.05	9.84	215
1971	8.83	7.6	1.24	85.98	14.02	1.46	30.75	256
1981	11.09	9.1	1.99	82.05	17.95	2.25	60.62	298
1991	13.21	10.61	2.6	80.33	19.67	0.83[@]	30.52	631
2001	16.62	13.17	3.45	79.22	20.78	3.41	32.99	670
2011	19.96	15.51	4.45	77.72	22.28	3.34	28.75	

Note: @ undivided U.P

Source-Census of India.

TABLE A.2: Rural and Urban Classification of Population (%) in Uttar Pradesh --- 1981-2011.

	1981		1991		2001		2011	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Uttar Pradesh	**82.07**	**17.93**	**80.3**	**19.7**	**79.2**	**20.8**	**77.72**	**22.28**
Northern Upper Ganga Plain	72.48	27.52	69.67	30.33	68.36	31.64	63.32	36.69
Southern Upper Ganga Plain	80.82	19.18	78.61	21.39	77.54	22.46	76.54	23.46
Central Region	80.32	19.68	77.87	22.13	77.12	22.88	76.06	24.79
Southern Region	80.08	19.92	80.91	19.09	79.54	20.46	79.08	20.92
Eastern Region	90.07	9.93	89.06	10.94	89.07	10.93	88.51	11.49

Source: Calculated from Census Reports

	Population							Decadal Growth (%)					
	1951	1961	1971	1981	1991	2001	2011	1951-61	1961-71	1971-81	1981-91	1991-01	2001-11
Agra UA	375665	508680	634622	747318	948063	1331339	1746467	35.41	24.76	17.76	26.86	40.43	31.18
Allahabad UA	332295	430730	513036	650070	844546	1042229	1216719	29.62	19.11	26.71	29.92	23.41	16.74
Ghaziabad UA	43745	70438	137033	287170	511759	968256	2358525	61.02	94.54	109.56	78.21	89.2	143.58
Kanpur UA	705383	971062	1275242	1639064	2029889	2715555	2920067	37.66	31.32	28.53	23.84	33.78	7.53
Lucknow UA	496861	655673	813982	1007604	1669204	2245509	2901474	31.96	24.14	23.79	65.66	34.53	29.21
Meerut UA	245179	294853	383106	542998	849799	1161716	1424908	20.26	29.93	41.74	56.5	36.7	22.66
Varanasi UA	369799	505952	635175	797162	1030863	1203961	1435113	36.82	25.54	25.5	29.32	16.79	19.20

Source: Provisional Population 2011, Town and Country Planning Organisation, Ministry of Urban Development, GOI, January 2012

Table A.4: Classwise Growth of Urban Population (%): 1901-2001

Years	Class I	Class II	Class III	Class IV	Class V	Class VI
1901	24.20	13.97	11.42	18.28	21.22	10.91
1911	25.66	13.49	11.00	18.47	19.64	11.74
1921	25.71	15.34	10.68	15.73	19.6	12.93
1931	27.89	14.25	15.82	15.29	16.78	9.97
1941	37.77	10.81	16.99	12.89	15.21	6.32
1951	45.70	9.04	14.4	11.42	13.51	5.94
1961	54.88	11.76	16.65	10.85	5.65	0.22
1971	57.66	10.93	16.87	9.83	4.54	0.18
1981	51.48	12.43	12.82	13.39	8.46	1.42
1991	55.54	11.83	14.04	12.27	5.85	0.51
2001	58.87	11.36	15.55	11.04	3.04	0.14

Source: Changing face and challenges of Urbanisation (A case study of Uttar Pradesh) by shahnazpraveen

Regions	Town No.		Class IV				Class V				Class VI			
			1991		2001		1991		2001		1991		2001	
	1991	2001	Population	Number	Population	Number	Population	Number	Population	Number	Population	Number	Population	Number
NUGP	**123**	**129**	**318582**	**11**	**495008**	**13**	**789161**	**12**	**128368**	**18**	**975816**	**31**	**119733**	**40**
			5		**7**				**9**				**5**	
SUGP	**203**	**215**	**406886**	**12**	**501359**	**15**	**675688**	**10**	**109126**	**17**	**123668**	**36**	**177550**	**63**
			9		**2**				**8**		**7**		**6**	
CR	95	98	397538	6	557300	8	402611	6	323904	5	487799	18	651960	22
			1		1									
SR	49	55	313491	1	816844	4	329707	3	286515	5	481603	10	365345	12
ER	179	202	294638	8	427249	14	132938	12	722262	10	117454	26	131153	47
			3		5		1				4		2	

Note:NUGP=Northern upper Ganga Plain, SUGP= Southern upper Ganga Plain, CR= Central Region, SR= Southern Region, ER= Eastern Region

Source: Calculated from Census 1991,2001

Table A.5 (b): Class-wise Number of towns and population across different Regions of Uttar Pradesh

Regions	Town No.		Class IV				Class V				Class VI			
			1991		2001		1991		2001		1991		2001	
	1991	2001	Population	Number	Population	Number	Population	Number	Population	Number	Population	Number	Population	Number
NUGP	**123**	**129**	**860905**	**59**	**724914**	**49**	**74896**	**9**	**57662**	**8**	**3581**	**1**	**4890**	**1**
SUGP	**203**	**215**	**114728 9**	**65**	**998369**	**70**	**562387**	**68**	**359441**	**43**	**45931**	**11**	**23935**	**6**
CR	95	98	321864	23	433259	31	495290	35	241396	31	12914	3	8229	2
SR	49	55	347788	15	255834	19	185528	16	118973	15	19201	3	0	0
ER	179	202	157825 6	68	129713 0	94	761198	62	254487	32	8643	2	16839	4

Note:NUGP=Northern upper Ganga Plain, SUGP= Southern upper Ganga Plain, CR= Central Region, SR= Southern Region, ER= Eastern Region

Source: Calculated from Census 1991,2001

Table A.6: Household Main Occupation (%) in rural and urban areas, Uttar Pradesh, 1983-2010

Particulars	1983	1987-88	1993-94	1999-00	2004-05	2009-10
Rural Area						
Self employed in non-agriculture	13.1	12.7	13.2	14.7	18.5	16
Agricultural labourer	18	20.1	15.3	19.7	13.7	11.3
Other labour	4.1	5.5	3.9	5.7	9.2	18.1
Self employed in agriculture	56.2	53.9	54.2	46.8	49.2	44.7
Others	8.6	7.7	13.3	13.2	9.4	9.8
Urban Area						
Self employed	45.1	45.6	46.4	46.7	49.3	43.5
Regular wage/salary earning		35.3	34	33.9	34	30.2
Casual labour		9.1	9.3	10.4	8.8	12.7
Others	54.9	10	10.3	9	7.9	13.5

Note: computed from the unit level data of concerned NSS rounds.

Table A.7: Variation in migration profile between 1991 - 2001 for Uttar Pradesh based on migrants by last residence

	(Duration0-9years)		
	2001 Census	1991 Census	Variation (1991-2001) (%)
In-migrants (from other states)	1,431,551	728,329	96.6
In-migrants (from abroad)	61,248	58,960	3.9
Total in-migrants	1,492,799	787,289	89.6
Out-migrants	4,165,419	2,457,996	69.5
Net migrants (+/-)	-2,672,620	-1,670,707	60

source: http://censusindia.gov.in/Data_Products/Data_Highlights/Data_Highlights_link/data_highlights_D1D2D3.pdf

Table A.8 (a): Percentage distribution of slums in Uttar Pradesh and all India by type of

	ownership of land					
	notifiedslum			non-notifiedslum		
	private	public	not known /n.r.	private	public	not known /n.r.
UttarPradesh 2008-09	73	16	11	81	19	0
UttarPradesh 2002	98	2	0	74	25	1
all-India:2008-09	**37**	**60**	**3**	**42**	**54**	**5**
all-India:2002	**36**	**64**	**1**	**35**	**63**	**2**
	structure of majority of houses					
	notifiedslum			non-notifiedslum		
	pucca	semi pucca	katcha	pucca	semi pucca	katcha
UttarPradesh 2008-09	89	1	11	57	5	38
UttarPradesh 2002	61	38	1	16	45	40
all-India:2008-09	**64**	**30**	**7**	**50**	**29**	**21**
all-India:2002	**65**	**30**	**6**	**30**	**40**	**30**

Table A.8 (b): Percentage distribution of slums in Uttar Pradesh and all India by type of

	major source of drinking water							
	notifiedslum				non-notifiedslum			
Uttar Pradesh/INDIA	tap	tube-well	well	others	tap	tube-well	well	others
UttarPradesh 2008-09	22	79	0	0	24	76	0	0
UttarPradesh 2002	34	67	0	0	59	41	0	0
all-India:2008-09	**79**	**17**	**1**	**3**	**77**	**17**	**2**	**3**
all-India:2002	**84**	**10**	**2**	**4**	**71**	**22**	**2**	**5**
	availability of electricity connection							
	notifiedslum				non-notifiedslum			
	households and street	households only	street light only	no electricity	households and street	households only	street light only	no electricity
UttarPradesh 2008-09	73	1	11	15	17	25	24	34
UttarPradesh 2002	67	33	0	1	41	13	1	46
all-India:2008-09	**76**	**16**	**7**	**1**	**53**	**26**	**15**	**7**
all-India:2002	84	11	4	1	53	25	6	16

Table A.9: Industrial Indicators of Uttar Pradesh

	No. of Industrial areas per lakh population	No. of small scale industries per lakh population	Net value added per worker in registered factories (000 Rs)	No. of employees in registered factories per lakh of population
District	2009-10	2009-10	2006-07	2006-07
Saharanpur	0.03	26.31	1859.11	316.63
Muzaffarnagar	0.02	28.35	127.32	389.62
Bijnor	0	14.44	237.17	700.29
Moradabad	0.04	17.63	22.53	946.92
Rampur	0.09	22.97	326.42	360.1
JyotibaPhule Nagar	0.12	15.49	179.84	1019.33
Meerut	0.09	40.41	0.26	627.15
Baghpat	0.16	28.46	4.92	266.83
Ghaziabad	0.34	31.25	62.14	1578.71
G.B.Nagar	0.39	78.79	152.25	11253.11
Bulandshahr	0.09	28.59	378.04	401.81
Aligarh	0.08	15.54	32.2	285.16
Hathras	0.07	22.75	25.59	206.69
Mathura	0.25	23.41	10267.62	490.53
Agra	0.11	19.47	1.97	957.68
Firozabad	0.04	23.2	12.69	583.92
Etah	0.11	10.12	739.43	36.01
Mainpuri	0.05	18.73	233.09	97.86
Badaun	0.03	17.59	758.94	102.09
Bareilly	0.02	21.3	169.31	422.92
Pilibhit	0	32.08	10.55	287.17
Shahjahanpur	0.1	21.64	278.3	242.48
Farrukhabad	0.05	21.38	390	120.87
Kannauj	0	13.86	96.77	222.7
Etawah	0	21.26	14.57	159.6
Auraiya	0.08	12.25	8.71	42
Kheri	0.03	12.76	156.22	286.9
Sitapur	0.05	9.29	1.03	137.08
Hardoi	0.03	9.86	11.08	70.49
Unnao	0.16	20.52	345.69	257.01
Lucknow	0.07	20.41	32.31	399.95
Rae Bareli	0.3	14.52	64.65	106.4
Kanpur Deh	0.28	19.32	429.77	334.4
Kanpur Nag	0.18	17.79	26.77	1043.7

	No. of Industrial areas per lakh population	No. of small scale industries per lakh population	Net value added per worker in registered factories (000 Rs)	No. of employees in registered factories per lakh of population
Fatehpur	0.04	19.7	213.62	94.75
Barabanki	0.1	16.07	8.2	219.64
Jalaun	0.12	23.72	425.62	77.99
Jhansi	0.1	28.51	1159.51	231.8
Lalitpur	0.17	37.75	326.25	2.79
Hamirpur	0.09	22.91	42.58	63.16
Mahoba	0	21.18	809.79	13.26
Banda	0.12	21.15	551.22	10.34
Chitrakoot	0.2	13.23	..	..
Pratapgarh	0.03	11.02	42.88	4.25
Kaushambi	0	18.12	237.27	86.56
Allahabad	0.02	10.02	503.1	253.65
Faizabad	0.08	17.4	31.44	84.96
Ambedkar Nagar	0	12.12	1227.68	57.69
Sultanpur	0.32	12.49	26.83	140.86
Bahraich	0	14.06	78.82	57.14
Shrawasti	0	5.72	0	..
Balrampur	0.05	3.9	457.28	150.79
Gonda	0	10.31	275.48	45.51
Siddharth Nagar	0	8.16	0	*
Basti	0.04	12.65	3.05	62.36
SantKabir Nagar	0.06	4.08	67.13	26.12
Mahrajganj	0	10.56	402.59	44.25
Gorakhpur	0.02	11.97	3.29	183.69
Kushinagar	0	4.27	163.81	122.15
Deoria	0.03	11.34	70.04	59.55
Azamgarh	0	5.95	64.78	18.31
Mau	0.05	15.39	11.39	51.44
Ballia	0	14.47	2711.75	17.12
Jaunpur	0.02	10.92	53.33	71.16
Ghazipur	0	14.52	14.05	58.06
Chandauli	0.1	13.92	13.69	96.5
Varanasi	0.03	15.51	16.38	143.13
SantRavidas Nagar	0	19.07	154.81	263.31
Mirzapur	0	13.88	81.53	47.31
Sonbhadra	0.05	21.79	2705.89	764.88
Uttar Pradesh	**0.07**	**17.39**	**361.38**	**373**

Source: District-wise development indicators, Uttar Pradesh

TableA.10 : Industrial Indicators of Uttar Pradesh

	Per capita gross value of industrial production(Rs)	No. of working factories per lakh of population	District wise percentage distribution of registered factories	Average workers per registered working factory
Districts	**2006-07**	**2006-07**	**2006-07**	**2006-07**
Saharanpur	6329.35	5.09	1.42	47.34
Muzaffarnagar	8865.09	9.82	3.42	29.62
Bijnor	5603.53	6.54	2.04	92.63
Moradabad	6278.16	9.36	3.6	92.48
Rampur	4024.15	5.5	1.05	53.69
JyotibaPhule Nagar	10790	6.61	0.92	132.08
Meerut	9802.88	14.83	4.37	31.43
Baghpat	3559.26	3.68	0.4	60.27
Ghaziabad	36118.3	33.82	11.97	33.6
G.B.Nagar	235500	155.38	19.56	53.38
Bulandshahr	11337.3	9.1	2.54	31.57
Aligarh	4188.91	5.37	1.61	45.51
Hathras	1843.48	7.36	0.88	23.33
Mathura	63868.4	7.07	1.44	50.47
Agra	6690.69	11.93	4.36	71.07
Firozabad	2760.82	12.34	2.58	39.9
Etah	1292.43	0.81	0.22	34.44
Mainpuri	1387.08	3.79	0.58	22.09
Badaun	2358.84	0.59	0.18	129.85
Bareilly	6074.49	7.56	2.7	44.14
Pilibhit	4234.66	3.83	0.63	48.52
Shahjahanpur	4530.05	3.93	1	43.56
Farrukhabad	941.77	3.63	0.56	26.46
Kannauj	1181.63	6.78	0.9	27.84
Etawah	557.55	3.87	0.5	35.54
Auraiya	203.74	1.34	0.15	29.59
Kheri	4676.41	2.83	0.92	75.9
Sitapur	2417.86	2.27	0.82	41.8
Hardoi	1112.6	1.07	0.35	47.5
Unnao	5905.6	3	0.79	68.55
Lucknow	8103.81	9.74	3.66	27.03
Rae Bareli	1194.82	1.64	0.46	51.79
Kanpur Deh	13212.9	5.6	0.86	48.63
Kanpur Nag	11489	20.35	8.37	40.73
Fatehpur	50419.2	2.97	0.66	21.95
Barabanki	3852.73	2.92	0.77	59.61
Jalaun	2590.14	1.33	0.19	52.43
Jhansi	3118.43	3.76	0.64	46.53

Lalitpur	7.91	0.9	0.09	1.2
Hamirpur	2901.75	0.98	0.1	55.09
Mahoba	33.44	2.06	0.14	4.69
Banda	313.57	0.16	0.04	9.75
Chitrakoot	..	..	0.02	94.5
Pratapgarh	20.11	0.66	0.18	4.65
Kaushambi	330.83	2.14	0.26	34.07
Allahabad	5831.89	3.7	1.85	49.15
Faizabad	1476.8	3.11	0.64	20.13
Ambedkar Nagar	1839.31	1.68	0.34	23.68
Sultanpur	5258.57	1.72	0.54	68.07
Bahraich	1000.01	0.87	0.31	46.71
Shrawasti	..	..	0.01	11
Balrampur	3344.48	1.24	0.2	94.17
Gonda	1619.39	0.45	0.12	80.93
Siddharth Nagar	*	*	*	*
Basti	1019.3	0.22	0.04	183.8
SantKabir Nagar	441.79	0.57	0.08	36.67
Mahrajganj	675.42	0.77	0.17	40.42
Gorakhpur	2912.05	3.14	1.16	47.15
Kushinagar	1160.86	0.37	0.11	247.92
Deoria	415.19	0.7	0.19	61.29
Azamgarh	71.67	0.61	0.24	20.11
Mau	404.17	1.59	0.29	22.85
Ballia	99.84	0.3	0.08	39.33
Jaunpur	2211.72	1.82	0.69	31.56
Ghazipur	256.28	1.35	0.41	38.28
Chandauli	3591.83	5.45	0.89	11.95
Varanasi	1806.44	4.48	1.39	23.34
SantRavidas Nagar	4052.36	4.38	0.58	45.92
Mirzapur	478.9	3.24	0.68	10.62
Sonbhadra	19053.9	0.59	0.09	1054.8
Uttar Pradesh	**7653.21**	**6.09**	**100**	**47.58**

Source: District-wise development indicators, Uttar Pradesh

Status of Urbanization and Industrialization in West Bengal

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology

IIT Bombay | IIT Delhi | IIT Guwahati | IIT Kanpur | IIT Kharagpur | IIT Madras | IIT Roorkee

Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP).The overall Frame Work for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who have contributed directly and those who have taken lead in preparing this report is given on the reverse side.

Dr Vinod Tare
Professor and Coordinator
Development of GRBMP
IIT Kanpur

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1. Introduction

Development of a nation presupposes inter alia growth of urban areas, on the one hand and industrialization, on the other. While rapid urbanization and industrialization is considered cornerstone for faster growth of a nation's economy, it comes at a significant environmental cost, if the process is not directed and controlled appropriately and if it does not imbibe the principles of the much used and abused term 'sustainable development'. Rapid, unregulated and unsustainable development including ruthless industrialization entail not only greater demand for natural resources and environmental goods, but it also leads to compromising of environmental quality .

In the course of history all major civilizations have developed on the banks ofmajor river and River Ganga is no exception. Since time immemorial, River Ganga has been a perennial source of livelihood for millions of people across the country. However, due to, myriad of factors comprising, among others, population growth, unreasonable and unregulated growth of urban centres, unregulated pollution from industrial activities, significant infrastructure deficit and weak enforcement of legislations, the river is currently confronted with multitude of problems.

Against this backdrop, the present study attempts to examine the state of urbanization and industrialization in West Bengal – one of the leading basin states, and offer possible solutions for reviving and restoring water quality of River Ganga[1]. Accordingly, this report is divided in two broad sections – first section dealing with issues and challenges arising out of urbanization in West Bengal; and second section dealing with the issues and challenges related to industrial development and the consequent implications on River Ganga Subsequently the last section presents a set of conclusions and recommendations for consideration under the overall framework of the Ganga River Basin Management Plan (GRBMP).

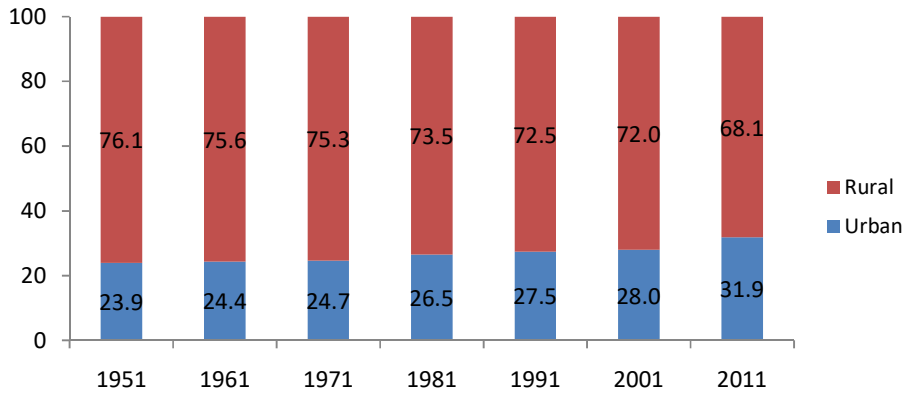
2. Urbanization in West Bengal

West Bengal's urbanization traces back to late 18th century when Kolkata, previously called Calcutta, emerged as the first port town and a commercial city. Urbanization was highly concentrated in the Calcutta region as British brought trade to Calcutta, which subsequently led to industrialization. Calcutta was the seat of colonial administration and the centre of colonial trade. Most of the major labour movements from Bihar, Uttar Pradesh and Orissa (now Odisha) to the tea gardens in Assam and plantations in Africa took place through Calcutta. Industrial growth around Calcutta was primarily based on export-oriented jute industry and was fuelled with the availability of favourable factors like access to port facility, inland water transport via the river-network supported by the Ganga and the railway infrastructure, thus covering a huge hinterland.

In course of history, there has been continual rise in the share of urban population in the state. As shown in Figure 1, around independence the level of urbansation in the state was 24% which was

[1] Similar profiles have been developed for other main states in the Ganga basin, viz., Uttarakhand, UP and Bihar. Subsequently a consolidated document is prepared for the entire Ganga basin.

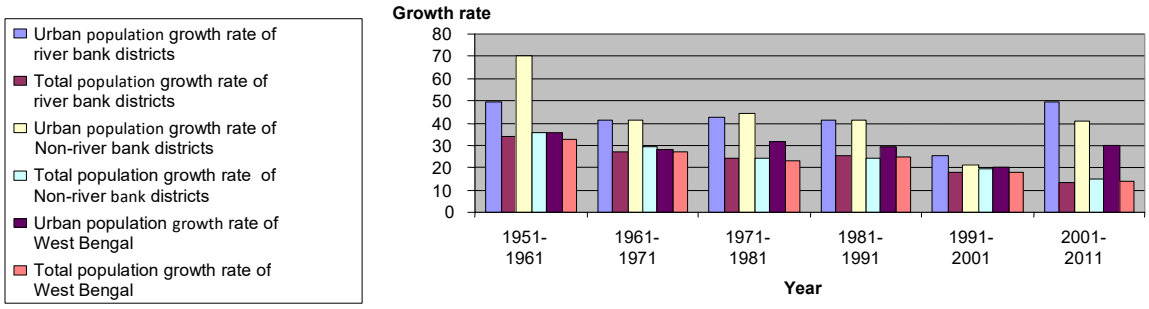
well ahead of several states in the country; and currently about 32% of the total population lives in urban areas. What is disquieting is that there has been spatial concentration of urban population in Kolkata urban agglomeration comprising the Kolkata Municipal Corporation Area and five other neighbouring districts viz. South 24-Paraganas, North 24 Paraganas, Howrah, Hoogly and Nadia. All these districts fall under the Ganga river basin. According to 2001 census, about 59% of the urban population of the state was residing only in Kolkata metropolitan area. Interestingly, Kolkata metropolitan area has three municipal corporations, 39 municipalities, 72 cities and 527 towns and villages. In 2011, Kolkata urban agglomeration was home to over 14.1 million population, making it the third-most populous metropolitan area in the country (Census of India, 2011). As a saturated city, Kolkata is confronted with overpopulation, unsustainable development, infrastructure deficiencies, unregulated growth of slums/ poor settlements, inadequate municipal services, considerable urban pollution and many other associated socio-economic problems.



Source: Census report of India, 2011

Figure 1: Rural-urban Distribution of Population in West Bengal during 1951-2011 (%)

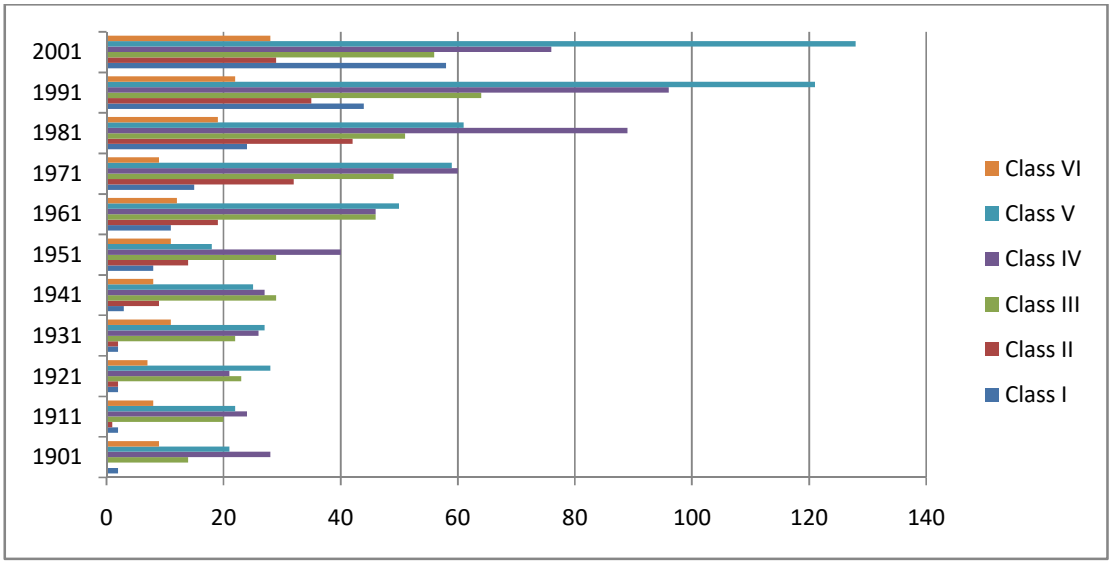
As shows in Figure 2 West Bengal witnessed slow and largely study rate of urbanization till 2001, the last decade has again experienced sudden upsurge in urban population. The estimates reveal that the growth rate of urban population in West Bengal declined during the period 1961-1971 and again steadily dropped especially during 1991-2001 before shooting up for a phenomenal rise again during the last decade. Likewise the growth rate of urban population in the 'river bank' districts recorded a phenomenal increase from 25% in 1991-2001 to 50% in the following decade. According to the provisional data of Census 2011 (Census of India, 2011), West Bengal remains one of the highly urbanized states of the country with currently 32% of the state's population residing in urban areas and it ranks fourth highest urbanised states in the country.



Source: Computed from the Census reports of the respective years

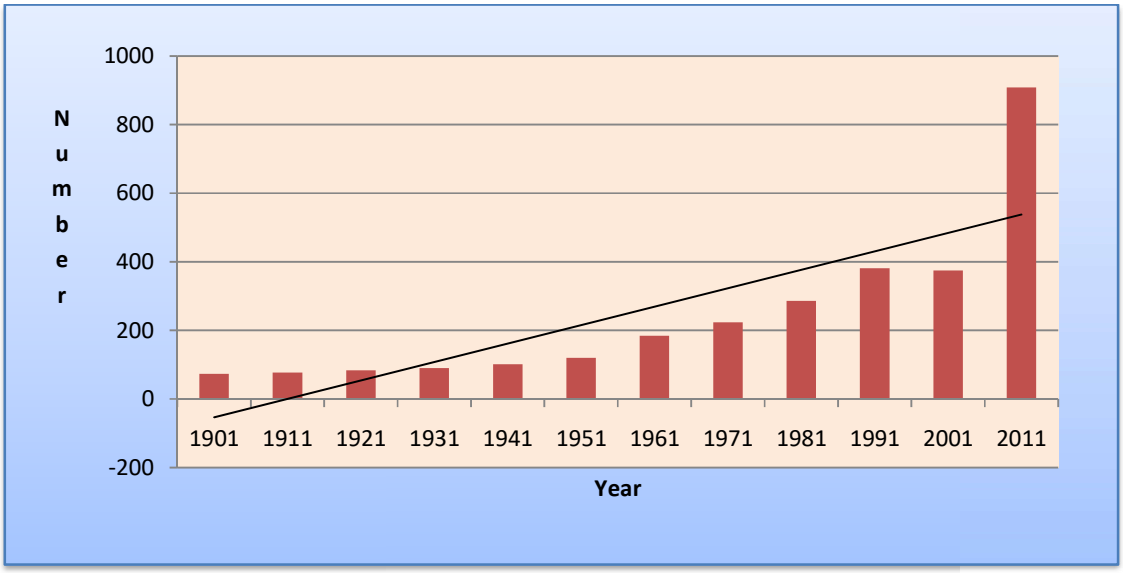
Figure 2: Growth rate of Urban and Total Population

According to the census 2011, West Bengal has made phenomenal jump in the number of urban centres over the last one decade. The number of 'census towns' has gone up from 255 in 2001 to 780 in 2011 and the number of statutary towns has increased from 375 in 2001 to 909 in 2011. In 2001, the state had as many as 58 class-I cities, 29 class-II cities and 56 class-III cities (Figures 3 & 4). It is interesting to note that as a consequence of forces of developmet around 580 hitherto villages have have graduated to the status of urban areas. As expected, towns and cities are largely concentrated in 'river bank' districts which accounted for almost 90% of class-I cities and 70% of class-II in 2001. North 24 Paraganas alone had a share of 22 cities in 2001 followed by 9 in Hooghly (Table 1).



Source: Census Report of India 1981, 1991, 2001

Figure 3: Number of Towns/Cities in West Bengal according to Class, 1901-2001



Source: Census Report of India of the relevant Years.

Figure 4: Number of Towns in West Bengal according to Years (1901 to 2011)

Table 1: District-Wise Classification Of Cities In West Bengal

District	I		II		III		IV		V		VI	
	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
River Bank District												
North 24 Paraganas	16	22	7	2	10	4	13	7	11	12	2	1
South 24 Paraganas	0	2	4	1	6	6	11	4	19	6	2	2
Burdwan	5	6	4	2	8	6	15	14	23	27	6	11
Hooghly	6	9	4	2	5	4	7	6	12	16	2	3
Howrah	3	3	1	1	3	7	17	14	22	23	1	5
Kolkata	1	1										
Malda	1	1		1	1		1		1	3		
Midnapore (Undivided)	3	3	2	4	4	4	9	4	1	4	3	2
Murshidabad	1	1	1	3	9	7	1	5	6	13		
Nadia	3	3	4	5	4	3	4	4	11	10	1	
Sub-total	39	51	27	21	50	41	78	58	106	114	17	24

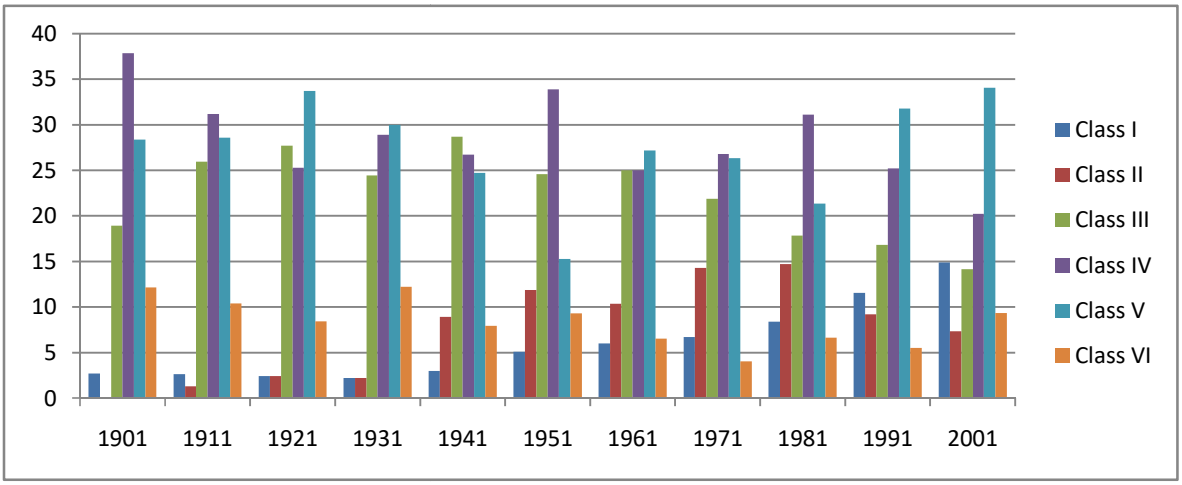
District	I		II		III		IV		V		VI	
	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001

Non River Bank District												
Bankura	1	1	1	1	1	1	1	1	2	1	1	
Birbhum			2	3	4	2				1	1	
Coochbehar			1	1		2	5	5	3	1		1
Darjeeling	1	2	1		2	2	2	2	1	2	2	1
Dakshin Dinajpur	1	1		1	1				1			
Jalpaiguri	1	1	2	1	3	4	5	7	4	2		1
Purulia		1	1		1	3	4	2	3	5	1	1
Uttar Dinajpur	1	1		1	2	1	1	1	1	2		
Sub-total	5	7	8	8	14	15	18	18	15	14	5	4
West Bengal	44	58	35	29	64	56	96	76	121	128	22	28

Source: Census of India: Relevant Issues

It is further noticed that the proportion of urban population in Class-I cities has risen over time. On the contrary, in class-II, III and IV cities, the proportion of population is found to have come down. However, the last two categories present an increasing trend (Figure 5). All these clearly reveal the enormity of the problems that has come up with the pace and nature of urbanization in West Bengal. Especially, the growth of class-I cities across the river basin both in terms of size and number may pose a serious challenge not only to the health of the river basin in particular but also in terms of public health, safety and quality of life in general.

Another important feature of urbanization in West Bengal is the high density of urban population which in Census 2001 was recorded to be around 6798 per sq km. Intriguingly at that point of time almost 28% of the urban population was residing in only 2.93% land area of the state (www.wburbandev.gov.in/11th_Plan/6-8.pdf) causing severe pressure on urban and municipal infrastructure, services and quality of life.

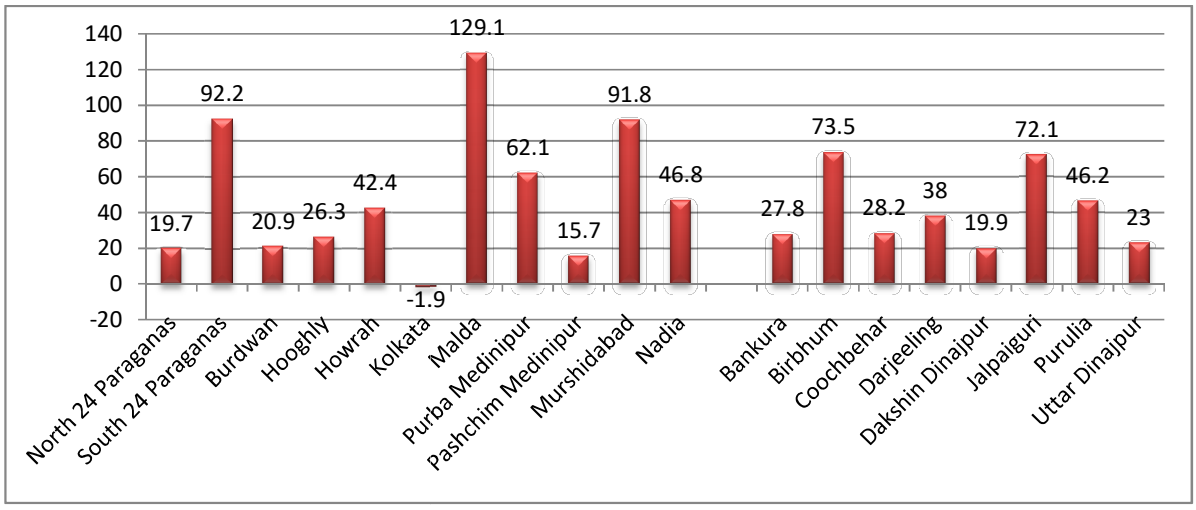


Source: Census of India, Relevant Issues.

Figure 5: Proportion of Urban Population in West Bengal according to Class, 1991-2001

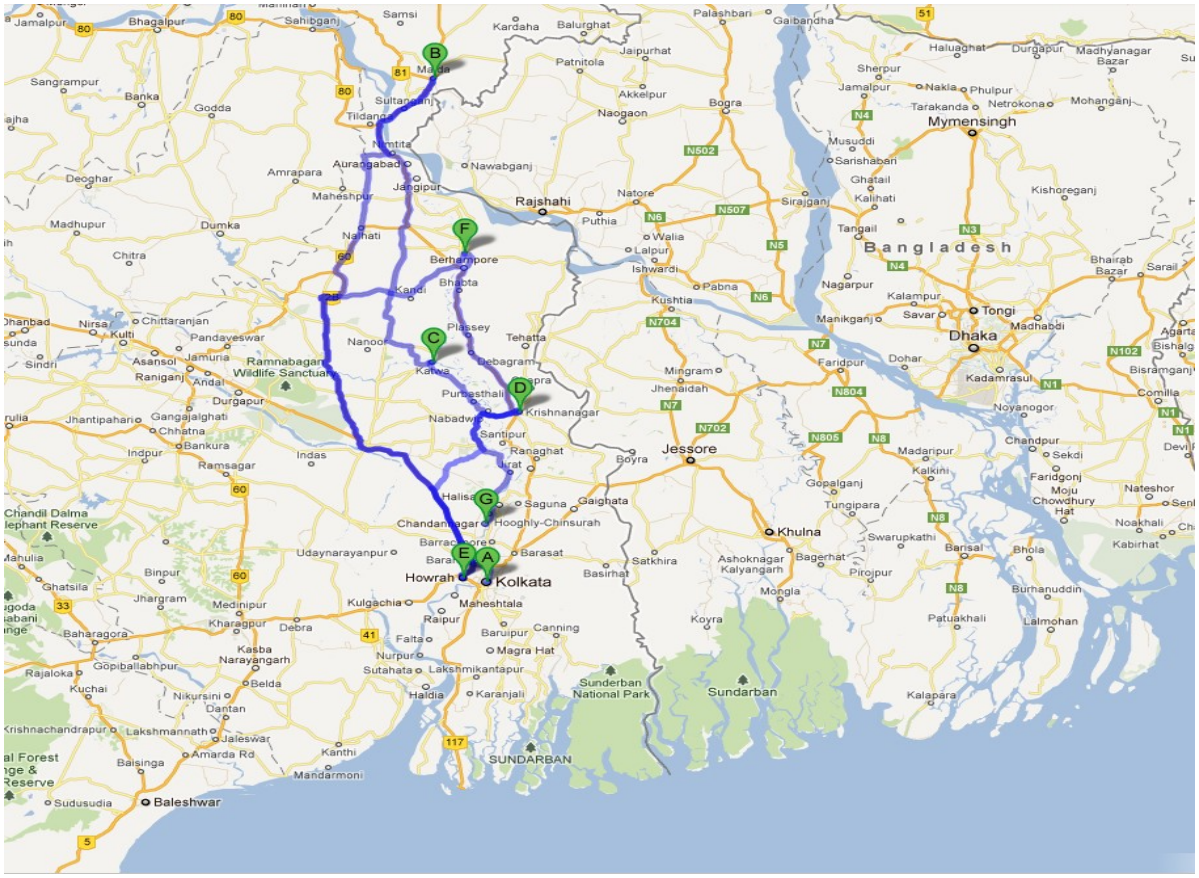
2.1. Regional Pattern of Urbanization in West Bengal

As stated earlier, and as depicted in Figure 6 the growth rate of urban population is relatively higher in most of the 'river bank' districts of the state signifying comparatively higher prospects for economic growth and focus of developmental interventions. Some of the districts with exceptional decennial growth in urban population during 2001-11 comprise Malda (129%), South 24 Paraganas (92%) and Murshidabad (92%) indicating phenomenal shift of population towards urban centres as well as graduation of hitherto relatively larger villages into smaller census/ statutary towns. On the otherhand it is interesting to note that Kolkata which is over three year old city has recorded negative growth rate during the last decade, signifying saturation and decelaration. Evidentaly increasing pressure on infrastructure, rising real estate costs and declining quality of life in Kolkata has led to out migration.



Source: Census Report of India 2011

Figure 6: Growth Rate of Urban Population in West Bengal in 2001-2011 (%)



Kolkata (A), Malda (B), Katwa (C), Krishnanagar (D), Howrah (E), Murshidabad(F), Chandannagar (G)

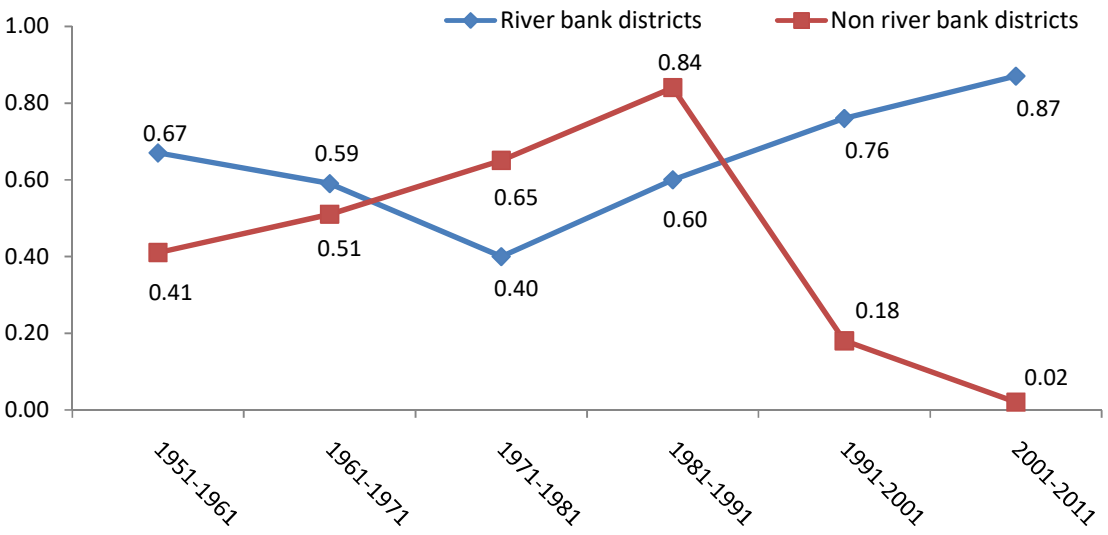
Source: http://maps.google.co.in/

Figure 7: Major Urban Centres along River Ganga in West Bengal

As shwon in Figure 8 in the case of the river bank districts of West Bengal there exists a strong correlation between urban population and total population. As stated earlier, this signifies major part of urban population growth across West Bengal is led by high population growth in river bank districts in the last decade.

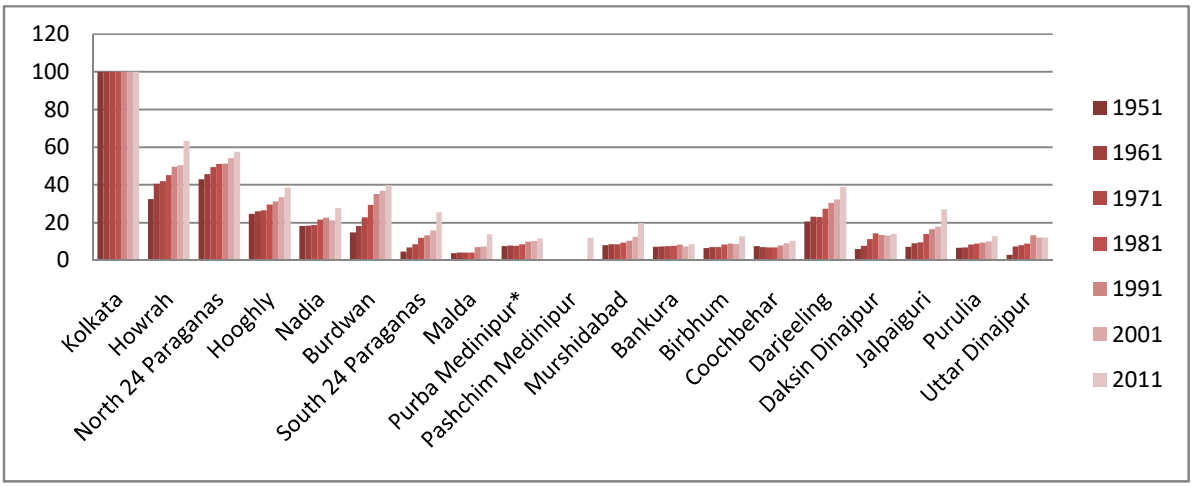
Figure 9 showns that there is greater concentration of urban population in river bank districts. Among these, Kolkata is classified as fully urbanized followed by Howrah with 63% and North 24 Paraganas with 58% urban population. There has been rise in the proportion of urban population in last decade in almost all districts of West Bengal, with river bank districts leading the trend.

From Figure 10 it is interesting to note that among the major towns in the state, Baranagar followed by South Dumdum, Kamarhati and Kolkata record incredibly high density of population which is inexcess of 24,000 persons/ sq.km. All these towns fall in the Kolkata Metropolitan Area while the former three fall in North 24 Parganas, exhibiting the extent of urbanization of the district.



Source: Census Report of India 1981, 1991, 2001 and 2011

Figure 8: Correlation Coefficient between Growth Rate of Urban Population & Total population



Source: Census Report of India, 2011

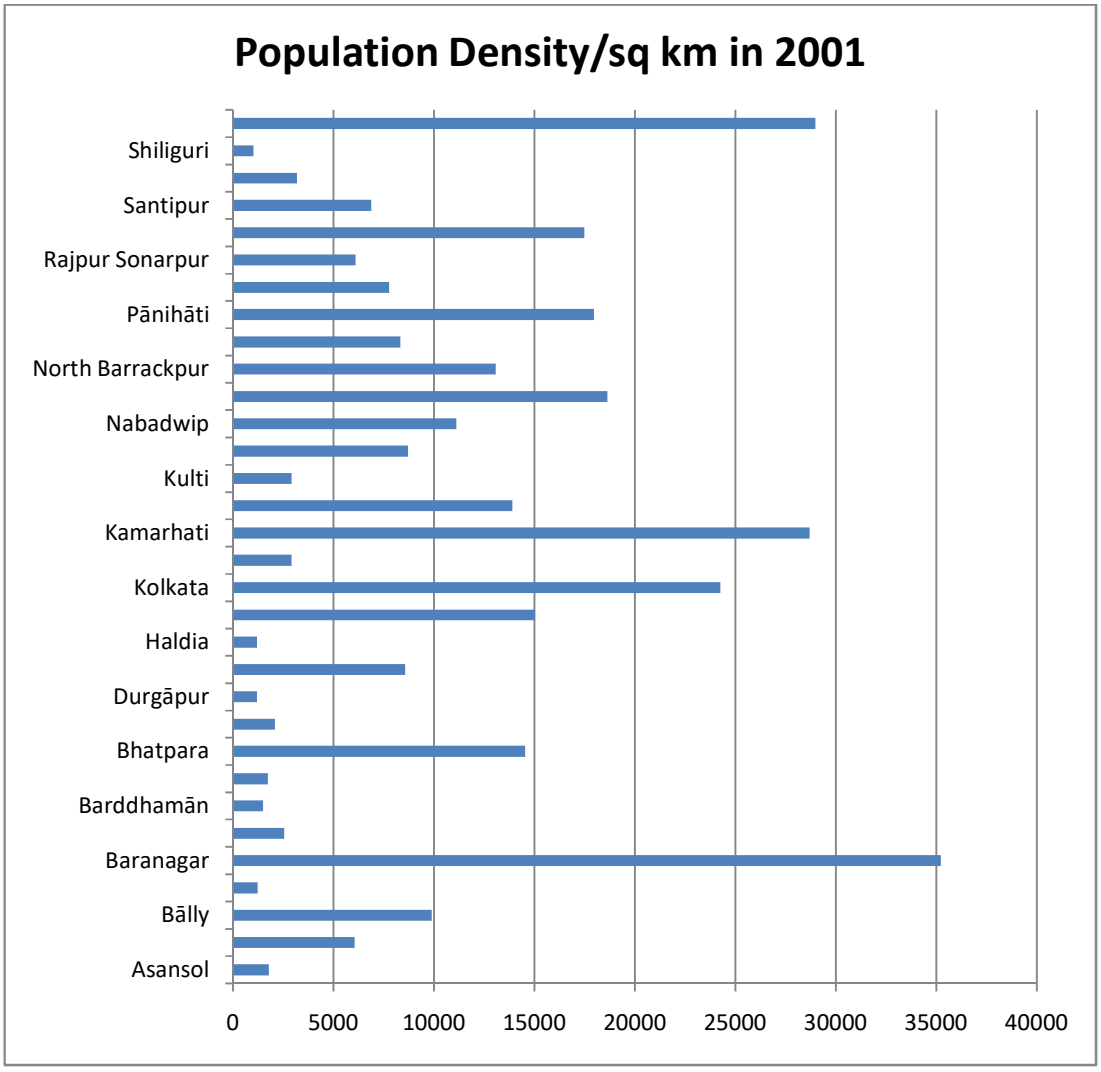


Figure 9: District wise percentage of urban population in West Bengal (1951-2011)

Table 2: District-Wise Urbanization Trend In West Bengal

Districts	1951	1961	1971	1981	1991	2001	2011
River Bank District							
North 24 Paarganas	Urbanization trend	Urbanization trend	Urbanization trend	Urbanized	Urbanized	Urbanized	Urbanized
South 24 Paraganas	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Burdwan	Still Rural	Still Rural	Still Rural	Still Rural	Urbanization trend	Urbanization trend	Urbanization trend
Hooghly	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Urbanization trend	Urbanization trend
Howrah	Still Rural	Urbanization trend	Urbanization trend	Urbanization trend	Urbanization trend	Urbanized	Urbanized

Districts	1951	1961	1971	1981	1991	2001	2011
Kolkata	Urbanized	Urbanized	Urbanized	Urbanized	Urbanized	Urbanized	Urbanized
Malda	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Midnapore (undivided)	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Murshidabad	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Nadia	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Non River Bank District							
Bankura	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Birbhum	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Coochbehar	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Darjeeling	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Daksin Dinajpur	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Jalpaiguri	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Purulia	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
Uttar Dinajpur	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural
West Bengal	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural	Still Rural

Source: Magnitude inferred from Table 4(Census Report of India 1981, 1991, 2001 and 2011, Government of West Bengal)

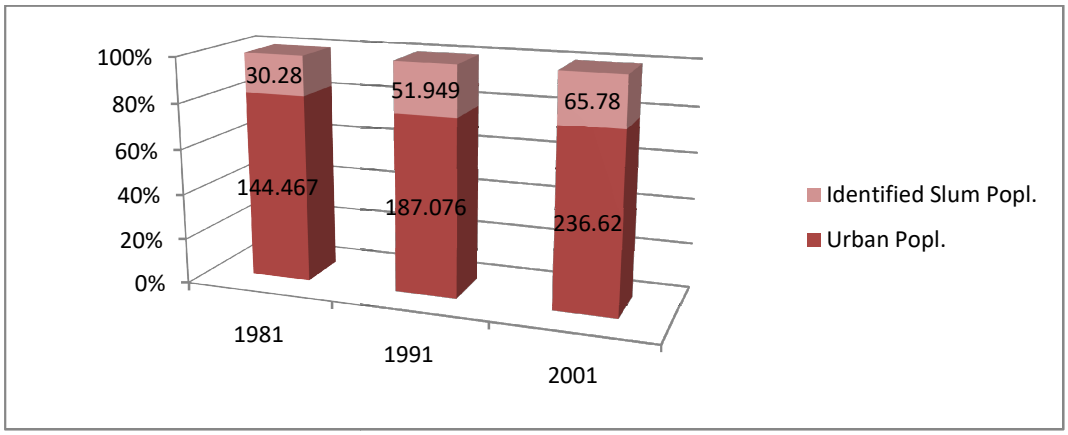
2.2. Migration Characteristics and Slum Population in West Bengal

Migration is one of the important factors contributing to the growth of urban population in the country. The total urban population of the country, excluding Jammu and Kashmir increased from 217.6 million in 1991 to 283.6 million in 2001 registering a growth rate of 30.3%. The migration data of Census 2001 indicate that 20.5 million people enumerated in urban areas across the country are migrants from rural areas who moved in during the last 10 years. In line with this trend, West Bengal has also witnessed significant rise in migration. In 2001, West Bengal was the third largest recipient of migrants (5.5 ml) by place of birth from other states and other countries next only to Maharashtra and Delhi (Census of India, 2001).

Examining the total number of in-migrants by last residence (duration 0-9 years) into important urban agglomerations, it is observed that Kolkata agglomeration is one of the leading destinations witnessing more than 8.22 lakh in-migrants during 1991-2001 and which constituted about 6.2% of the total population. Among them, over 4.70 lakh in-migrants were from within the state, 2.97 lakh from other states and the remaining 55,000 were from other countries e.g., Bangladesh, Myanmar, etc. (Census of India, 2001).

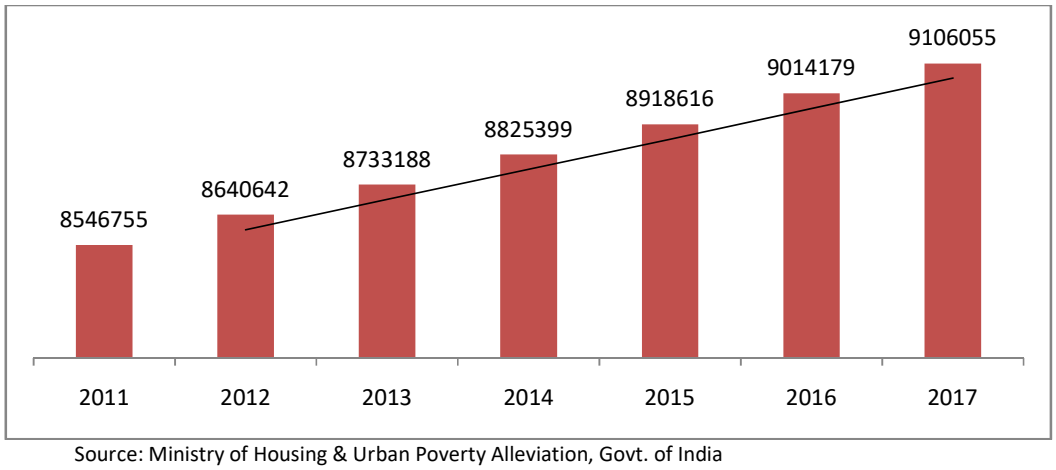
Obvious fallout of unrestrained urbanization is the concomitant rise in urban slums and slum population, posing further challenge to city administration as well for the receiving environment (Figure 11). According to an estimate, in 2000, there were 7828 slums in West Bengal of which as many as 6330 were non-notified (www.westbengalstat.com). Over the years the slum population in the state has risen considerably. From a modest 30 lakh slum population in 1981, it was

estimated to be close to 66 lakh in 2001 – the latter constituting a staggering 28% of the total population of the state. Close to 15 lakh people reside in slums in Kolkata M.C. alone which constitutes 39% of the total state slum population. Other urban centres with high concentration of slum population are Asonsol, Durgapur, Uluberia and Howrah (Annexure 14). According to an estimate, total slum population in West Bengal is projected to cross 8.5 million by 2011 and 9.1 million by 2017 (Figure 12).



Source: Compiled from the statistics released by: A Compendium on Indian Slums 1996, Ministry of Urban Affairs, Govt. of India and Compendium of Environment Statistics, 2000, Central Statistical Organisation, Ministry of Statistics and Programme Implementation, Govt. of India. www.westbengalstat.com

Figure 11: Identified/Estimated Slum population in West Bengal (in Lakh)



Source: Ministry of Housing & Urban Poverty Alleviation, Govt. of India

Figure 12: Projected Slum Population in West Bengal

With the proliferation of slums and slum population, urban living conditions across the cities and within the settlements invariably deteriorate. An estimate in Table 3 suggests that during 2002, as many as 373 for every 1000 slums did not have sewerage system. During the same period, arrangement for garbage disposal did not exist in 294 slums per 1000 slums. In 1993, out of every 1000 slums, as many as 228 slums had no drainage facilities and 590 had open drainage facilities

(www.westbengalstat.com). All this data clearly present miserable living conditions for the slum population in particular which affectes their health and in general the public health of city population as well.

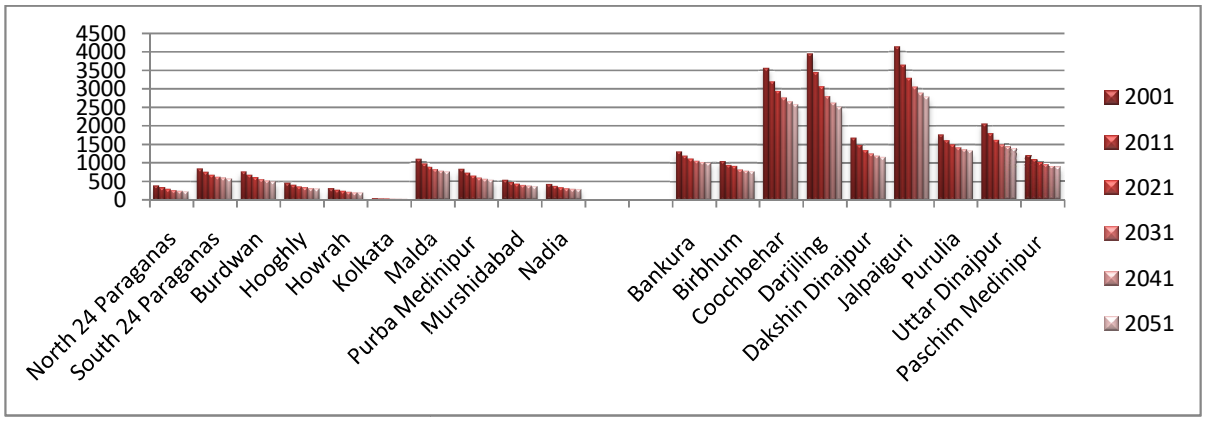
Table 3: Number Of Notified Slums By Availability Of Sewerage Per 1000 Slums In West Bengal (July 2002-December 2002)

States/UTs	Underground Sewerage System				Number of Slums	
	Available	Not Available	N.R.	All	Estimated	Sample
West Bengal	627	373	0	1000	2871	38
India	300	700	0	1000	26166	360

Source: Compiled from the statistics released by: Condition of Urban Slums, NSS Report No. 486, 58th Round (July 2002-December 2002).

2.3. Water Demand

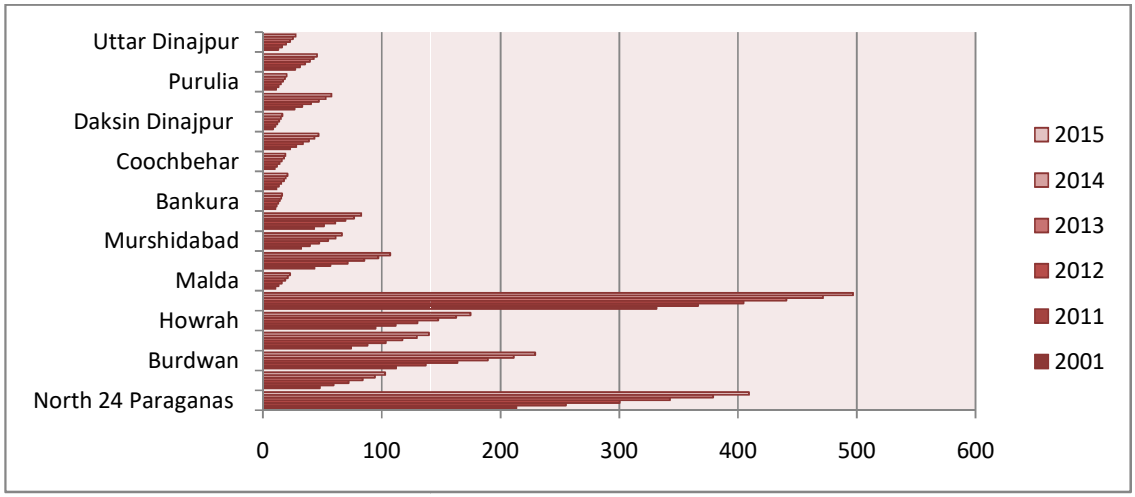
With the increase in population, the per capita availability of water across the districts of West Bengal is found to be low and also on the decline. All 'river bank' districts are found to have registered very low per capita availability of water compared to non-bank districts. This is possibly because there is greater concentration of population in 'river bank' districts. As shwon in Figure 13, with the increasing trend of urbanisation, per capita water availability in the 'river bank' districts is projected to fall rapidly compared to the non-bank districts. It is important to note that while on the one side across all districts there is a continual fall in per capita availability of water, the demand in urban areas in general is on the rise, thus carrying serious implications for the river Ganga. According to a recent projection, the demand for domestic water is expected to increase to 2102.5 BCM by 2015 from 1144.2 BCM in 2001 (Figure 14). As expected, Kolkata will continue to lead urban demand with its projected demand rising to 497 BCM by 2015 followed by North 24 Paraganas (409.28 BCM), Burdwan (229.13 BCM) and Howrah (174.79 BCM) (Figure 14). The river banks districts will witness total demand of as high as 1832 BCM (Figure 15) while that of the non-river banks will be only a small fraction at 15%.



Source: State of Environment Report on Water Resource and its Quality

Note: First ten districts are river-bank districts and the remaining are non-river bank districts.

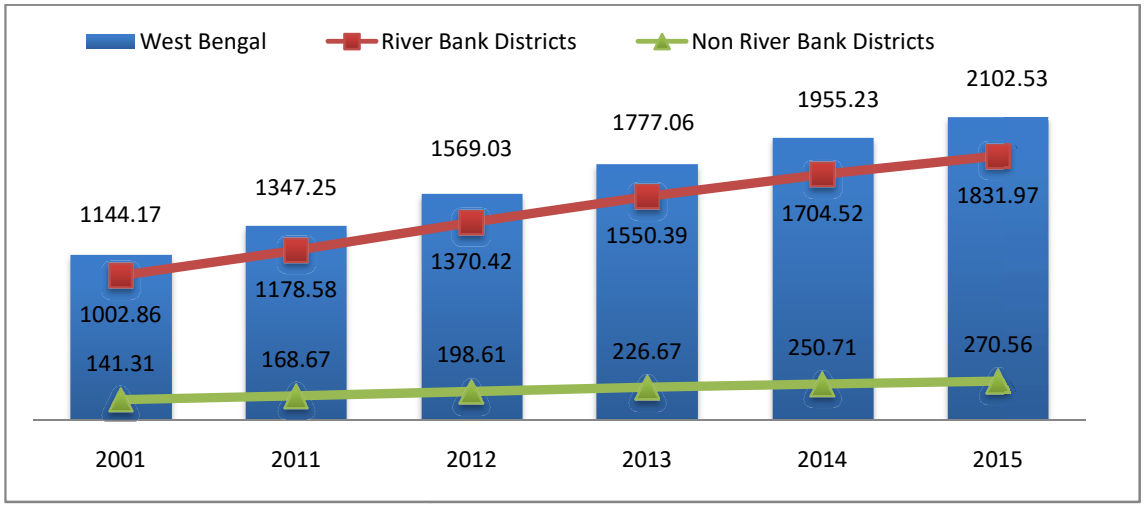
Figure 13: Per Capita Availability of Water in West Bengal (in cubic meter)



Source: Based on PFI Projections (PFI-PRB, 2007)

Note: First nine districts are non-river bank districts and the remaining ones are river bank districts.

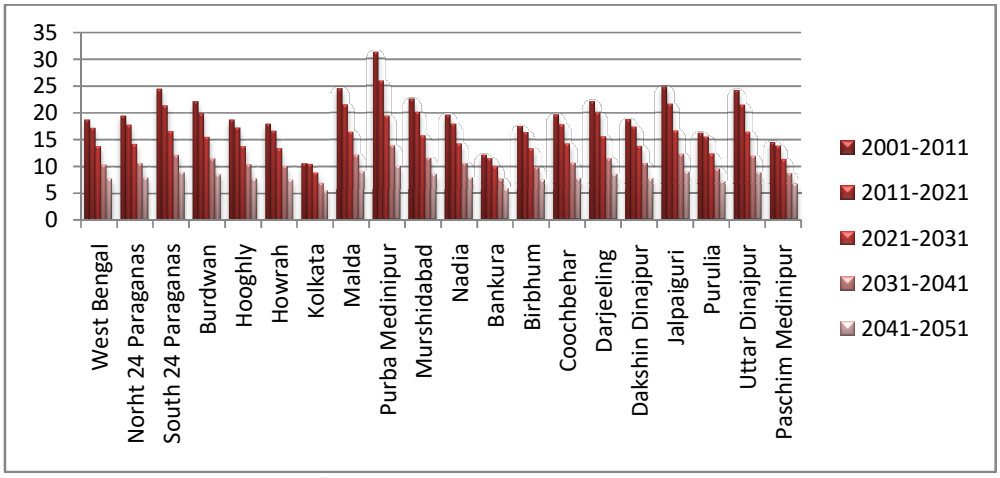
Figure 14: District wise Projected Demand for Domestic Water in Billion Cubic Meters



Source: Based on PFI Projections (PFI-PRB, 2007)

Figure 15: Projected Demand for Domestic Water in West Bengal in Billion Cubic Meters

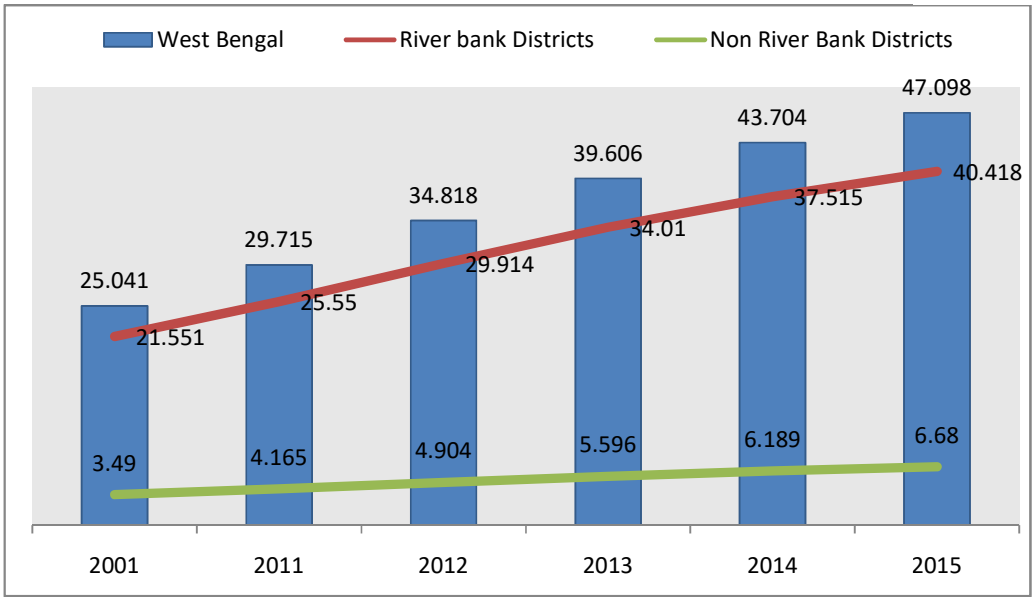
Considering growth rate of domestic water demand in West Bengal, it is predicted that commensurate with the increased urban population, the growth rate for West Bengal remains the highest during 2001-2011 (17.91%). During the subsequent decades, even if the growth rate of domestic water demand declines, a positive and high growth rate for the state indicates enormous pressure in the coming days on the river water as a significant source of domestic water (Figure 16).



Source: Based on PFI Projections (PFI-PRB, 2007).

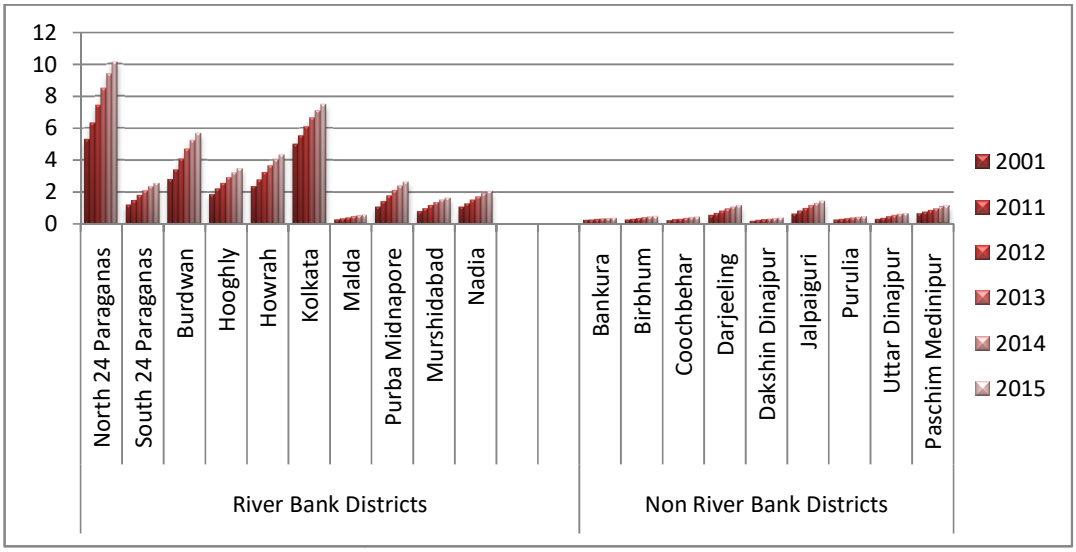
Figure 16: Growth Rate of Projected Demand for Domestic Water in West Bengal

Turning to drinking water, the scenario is no better. Urban demand for drinking water is projected to almost double from 25 BCM in 2001 to over 47 BCM by 2015 (Figures 17 and 18). Interestingly river bank districts, having larger concentration of urban population, will alone demand drinking water over 40 BCM by 2015. Similar to the domestic water demand, the decennial growth rate of drinking water in river bank districts will continue to remain higher than that in non-river bank districts (Figure 19).



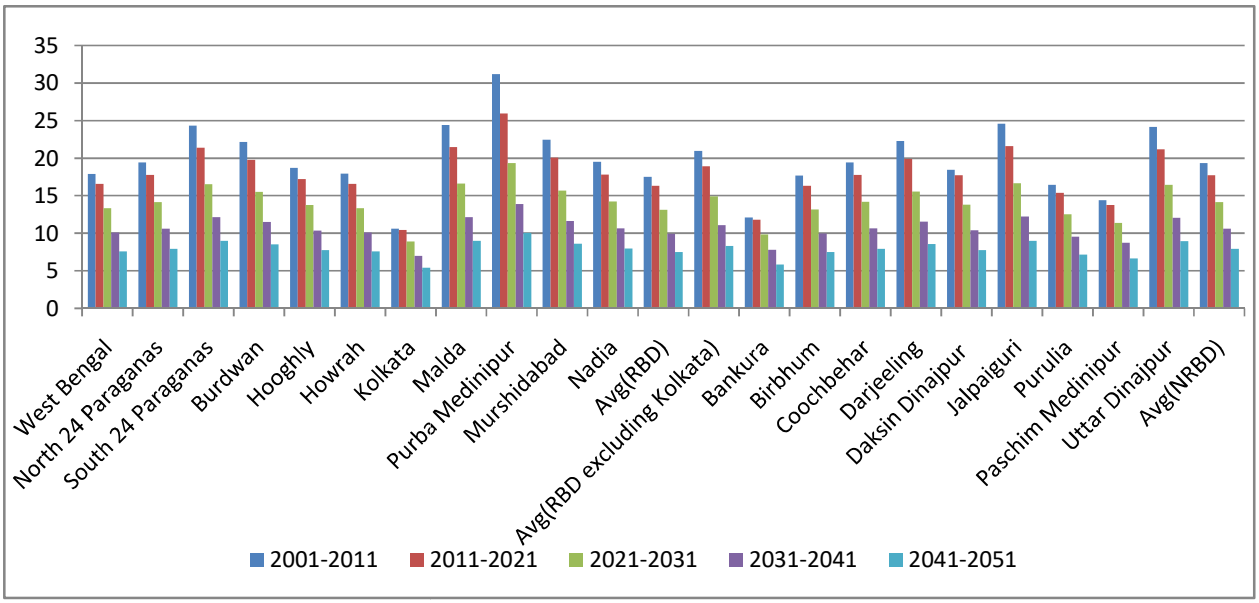
Source: Based on PFI Projections (PFI-PRB, 2007).

Figure 17: Projected demand for Drinking Water in Billion Cubic Meter (BCM)



Source: Based on PFI Projections (PFI-PRB, 2007).

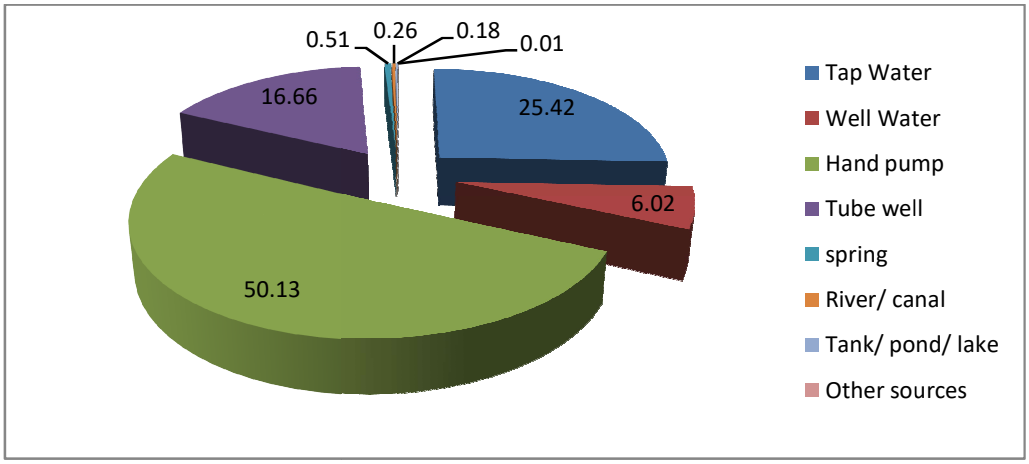
Figure 18: Districtwise projected demand for Drinking Water in Billion Cubic Meter (BCM)



Source: Based on PFI Projections (PFI-PRB, 2007).

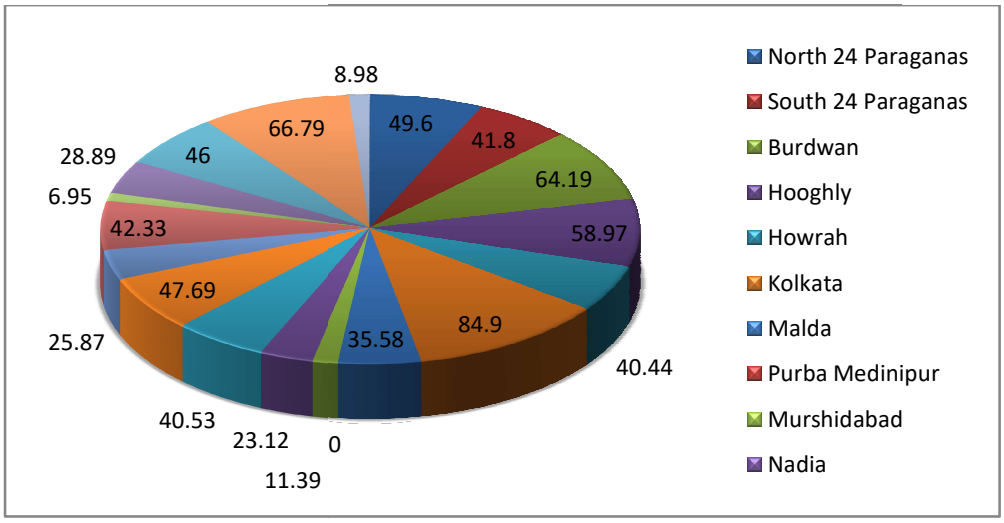
Figure 19: Growth Rate of Projected Demand for Drinking Water

In urban areas of West Bengal, tap water constitutes the single most prominent source of drinking water. The two other important sources are hand pumps and tube wells (Figure 20). Among the river bank districts, about 85% of the urban households in Kolkata have access to tap water from treated sources, while 59% of the urban households in Hooghly, 42% in south 24 Parganas and 40% in Howrah have access to tap water from treated sources (Figure 21).



Source: Estimated from the tables on houses, household amenities and assets, Census of India, 2011

Figure 20: Main Sources of Drinking Water in West Bengal (%)

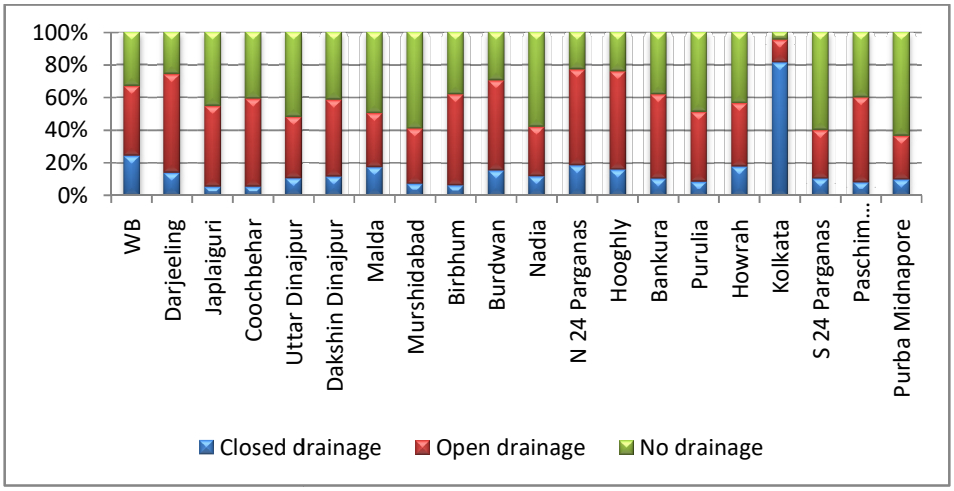


Source: Estimated from the tables on houses, household amenities and assets, Census of India, 2011

Figure 21: Percentage of Urban Households with Access to Treated Tap Water (%)

2.4 Wastewater drainage and treatment

Waste water disposal in urban areas of the state remains a major area of concern. In almost all the districts, a large majority of urban households are devoid of or have only access to open drainage facilities (Figure 22). Except for Kolkata, coverage with sewerage is very low. About 42% of the urban households discharge sewage into open drains, while over 33% do not have access to drainage facilities. This deficit of essential infrastructure has serious implications on public health and quality of life.



Source: Estimated from the tables on houses, households and assets, Census of India, 2011

Figure 22: Percentage Distribution of Waste Water Sewage Facilities for Urban Households

In this context it is also noted that in most of the Class-I and Class-II cities of West Bengal which discharge sewage in to River Ganga, there is serious shortfall in sewage treatment capacity. For instance in the case of Kolkata, as shown in Table 4, against estimated sewage generation of 618 MLD only a meager 28% is getting treated. For the 22 selected cities listed in Table 4 below, the aggregate deficit in sewage treatment capacity is reported to be 56%. It is also evident that a number of smaller cities and towns actoss the state do not have any form of treatment facility at all. As a reuslt of this infrastructure deficit a large volume of sewage is getting discharged into the River Ganga or its tributaries without any treatmnet. Looking at this scenario it is evident that a serious effort is needed to strengthen sewerage infrastructure in the urban areas across the state.

Table 4: Available Capacity For Sewage Treatment In Selected Cities In West Bengal

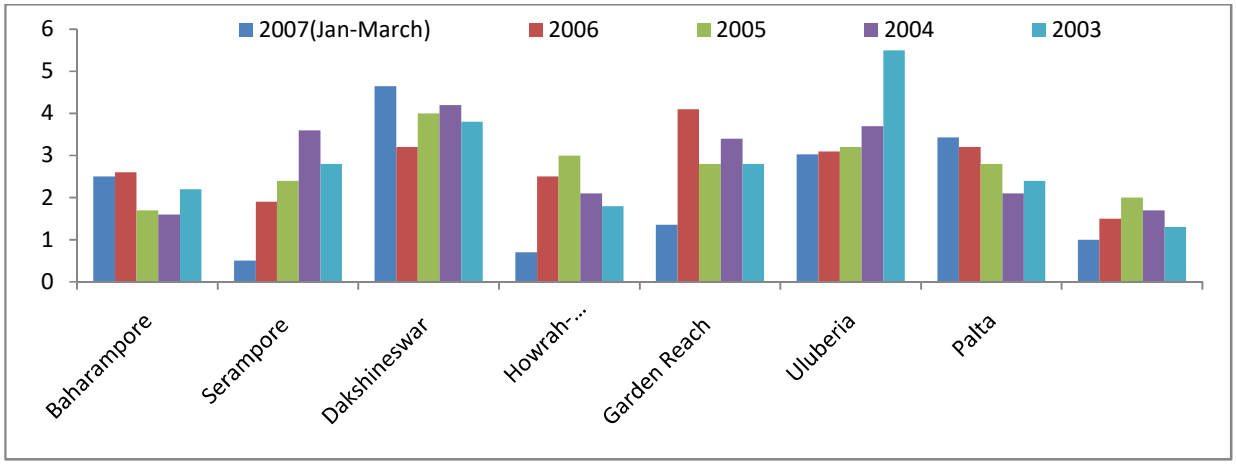
Sr. No.	City/Town	Total Sewage Generation (in MLD)	Treatment Capacity (in MLD)	Percentage covered	Treated Sewage Disposal
1	Kolkata	618.4	172	28%	Ganga river
2	Haldia	24.5	24.5	100%	Ganga riverbasin
3	Santipur	18.7	18.7	100%	Ganga river
4	Nabadwip	15.5	10	65%	Ganga river
5	Basirhat	15.3	-	0%	Ganga river
6	Bangaon	13.8	-	0%	Ganga river
7	South Dumdum	53	52.9	100%	Ganga river basin
8	Rajpur Sonarpur	33.6	45.4	100%	Ganga river basin
9	Kamarhati	48.8	40	82%	Ganga river
10	North Dumdum	29.7	-	0%	Ganga river basin

Sr. No.	City/Town	Total Sewage Generation (in MLD)	Treatment Capacity (in MLD)	Percentage covered	Treated Sewage Disposal
11	Ulberia	27.3	24	Naihati	Ganga /Other basin
12	Kanchrapara	17	-	0%	Ganga river
13	Halisahar	16.8	-	0%	Ganga river
14	North Barrackpore	19.2	16.7	87%	Ganga river basin
15	Rishra	13.5	15.3	100%	Ganga river
16	Ashoknagar Kalyangarh	17.3	15	87%	Ganga river basin
17	Howrah	136.2	63.9	47%	Ganga river
18	Bhatpara	59.7	28.5	48%	Ganga river
19	Maheshtala	52.5	3.9	7%	Ganga river
20	Serampore	26.7	18.9	71%	Ganga river
21	Chandannagar	16.1	22.7	100%	Ganga river
22	Habra	17.2	-	0%	Ganga river
	Total	1290.8	572	44.34%	

Source: Status of Water Supply, Waste Water Generation and Treatment in Class-I cities of India, CPCB, 2010

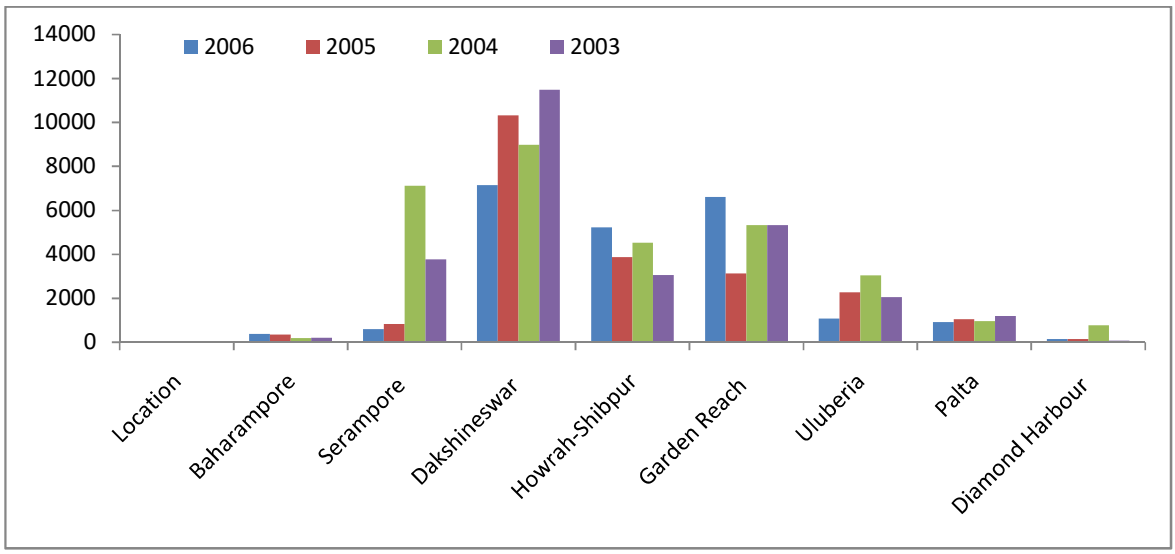
Impact on River Ganga

As result of discharge of untreated sewage into water bodies water pollution level across various locations in the state is on the rise. For instance in terms of 'biological oxygen demand' (BOD), most affected locations are Dhakhineshwar, Uluberia, Garden reach and Palta. Likewise in terms of total coliforms, a number of locations in Kolkata region are found to be above the prescribed limits. With increasing population, urbanisation and rising waste loads and without the concurrent strengthening of infrastructure, several places have recorded deterioration in the quality of the receiving water bodies (Figures 23 & 24 and Table 5).



Source: Statistical Abstract, 2008

Figure 23: Biological Oxygen Demand (BOD) [Standard " <3mg/l "] (in mg/l)



Source: Statistical Abstract, 2008

Figure 24: Total Coliform (TC) [Standard " <5000MPN/100ml"] (in mg/l)

Table 5: BOD, DO and Faecal Coliform Compliance with the Standard, and Trends in the River Ganga

Location	BOD		DO		Faecal Coliform	
	Compliance with std	Trend	Compliance with std	Trend	Compliance with std	Trend
Ganga at Bhagalpur Rajmahal	Yes	Increasing	Yes	Increasing	No	Decreasing
Rajmahal	—	Increasing	—	Marginally	—	Marginally increasing
Ganga at Kahalgaon	Yes	Marginally	Yes	Increasing	No	Decreasing
Baharampore	Yes	Decreasing	Yes	Marginally	No	Decreasing
Serampore	Yes	Decreasing	Yes	No trend	No	Decreasing
Dakshineshwar	No	Increasing	Yes	Marginally	No	No trend
Howrah-Shibpur	Yes	Decreasing	Yes	No trend	No	No trend
Garden Reach	Yes	Increasing	Yes	No trend	No	Marginally increasing
Uluberia	Yes	Marginally	Yes	Marginally	No	Marginally decreasing
Palta	Yes	Decreasing	Yes	Marginally	No	Decreasing
Diamond Harbour	Yes	No trend	Yes	Marginally	No	Decreasing

Source: Ganga Water Quality Trend, CPCB, 2010.

3. Industrialization in West Bengal

3.1. A Historical Account

West Bengal had a long tradition of leading the industrial economy of India. In the ancient and the medieval period, Bengal was one of the leading regions of the country in production of manufactured and industrial products. Abundance of natural resources coupled with availability of skilled artisans helped the province to achieve phenomenal growth of cottage industries, especially in the fields of silk goods and cotton fabrics. Growth of the industry sector accelerated further during the colonial regime. Modern industrialization process started in the province during this regime, with setting up of the first jute mill around 1850. Subsequently, the British made the province as the manufacturing hub in India. Endowment of rich and varied natural resources, locational facilities, and skilled workforce led to the foundation of a modern industrialization process. Besides, the huge domestic market in the eastern India as well as in the neighbouring countries like Nepal, Bhutan and other Southeast Asian countries had also facilitated rapid industrial growth in Bengal. Many major industrial companies such as Jessop Engineering, Richardson Cruddas, Gillanders Arbuthnot & Co., etc. had their roots in Kolkata.

Industrialization process reached its peak at the beginning of the twentieth century and Bengal experienced the highest rate of growth of the industry sector amongst all the states in the country (Sen, 1987). Bengal in general and Calcutta in particular became the centre of commercial and industrial activities of the eastern part of the country with high concentration of industrial capital. Even at the dawn of independence, West Bengal was the premier industrialized state in the country with employment of over six lakh people in the organized sector in 1948. Between 1948 and 1962, many of the major public sector manufacturing ventures such as Chittaranjan Locomotive Works, Durgapur Steel Plant and Damodar Valley Corporation were set up in the state. Industrial production during this period was largely confined to export oriented processing (e.g., jute), plantation (e.g., tea), extractive mining, and engineering (e.g., wagon making).

However, the situation started changing after independence, particularly since the beginning of the 1960s. During the British rule, the economy of Bengal was largely dominated by the multinational corporations and large business houses. But, with the beginning of the planning era, shackles were put on growth and expansion of these business houses. Second, due to the partition of Bengal, two major industries viz., jute and tea were adversely affected in addition to migration from the erstwhile East Pakistan that created huge population pressure in the state. Third, the discriminatory licensing system and freight equalization policy of the central government, as it has been debated since long, created bias against West Bengal. All these factors coupled with over commitment of the colonial firms towards unprofitable sectors forced many of the enterprises not to reinvest profits in the state, instead to remit them abroad or to set up business units in other states. In addition, political uncertainties prevented new investors from investing in the state.

As a result, the growth of the industry sector in West Bengal started slowing down, and eventually the state fell far behind other states like Gujarat, Maharashtra, Karnataka and Andhra Pradesh. The process of industrialization in the state came to a halt by the mid-sixties, and since then the industrial sector of West Bengal has been marked with rapid decline and pronounced stagnation. Over the years the share of the state in number of factories, net value added, and employment has declined drastically (Mishra, 1997). At disaggregate level, it is observed that growth of all the sectors except electrical goods and chemicals started decelerating since the mid-1960s (Banerjee, 1982). More importantly, absolute productions in many of the sectors like textiles, iron and steel, paper, etc. also declined during 1965-84 (Sen, 1987).

This deceleration in industrial activity over an extended period in the state resulted in severe contraction in industrial output and employment as well as capital outflow to other parts of the country in the 1970s and the 1980s. This had forced the state government to review its industrial policy, and a new industrial policy was introduced in September 1994 as an attempt to bring about a wholesome resurgence in the industrial sector of the state. Besides, there have been changes in the attitude of the state government towards industry and industrialists as well, especially after initiation of the process of reforms of the Indian economy in 1991 (Dasgupta, 1998; Sinha, 2005). Introduction of new industrial policy at the national as well as at the state level coupled with changes in the investment atmosphere of the state has resulted in a large number of proposals from different business groups showing interests to set up production units in the state.

However, despite changes in policies, initially West Bengal had failed to emerge as an attractive destination for investors, particularly when compared with other industrially progressive states in the country. More specifically, delicensing of most of the industries and partial freight equalization under the New Industrial Policy of 1991, and the '*non-doctrinaire and pragmatic approach'* of the state government in the new industrial policy of 1994 could not attract investors into the state at large scale. The volume of industrial investment in West Bengal in the 1990s was very low, especially in comparison with major industrial states of the country, viz., Gujarat, Maharashtra, and Tamil Nadu. In general, such low investment inflows have contributed to poor industrial relations, inadequate infrastructure facilities and low level of factory production that have resulted in low profitability of existing manufacturing units. This not only reduced the ability and willingness of these units to invest further in the state, but also discouraged the potential investors to invest therein.

However inflow of investment has started increasing since the beginning of the 21st century. Investment has been flowing into the state despite the global economic downturn and farmers' resistance against land acquisition at Nandigram and Singur. Although the state ranked eighth in number of factories, twelfth in value of output and eleventh in net value added by manufactures in 2005-06, new investment has changed the composition of industries in the state considerably. Key industries in West Bengal today include chemicals, textiles, coal, iron and steel, engineering goods, leather and leather products, tea, jute products, breweries, paper, drugs and

pharmaceuticals, electrical and electronics, plastics, software, locomotives, vegetable oils, and gems and jewelry. The Government of West Bengal has also emphasized on growth and development of electronic industries in recent years.

Major share of new investment has been in sectors such as iron and steel, petrochemicals, information technology and food processing. Given the resistance from the owners against acquisition of farm land, the state government is now emphasizing on the setting up of industries in areas that are considered as backward and have proportionately more uncultivable land. Efforts are being made towards location of new industrial units in the districts of Paschim Medinipur, Purulia, Bankura and Birbhum. Depending on the availability of non-agricultural land, presence of industry and infrastructure, the state government has identified certain areas as industrial growth zones where large-scale manufacturing units can be set up. Initiatives are also being made towards setting up of several sector-specific industrial parks viz. the Raghunathpur Industrial Park in Purulia district, the Vidyasagar Industrial Park in Paschim Medinipur district, etc.

3.2. Recent Trend in Industrial Growth in West Bengal

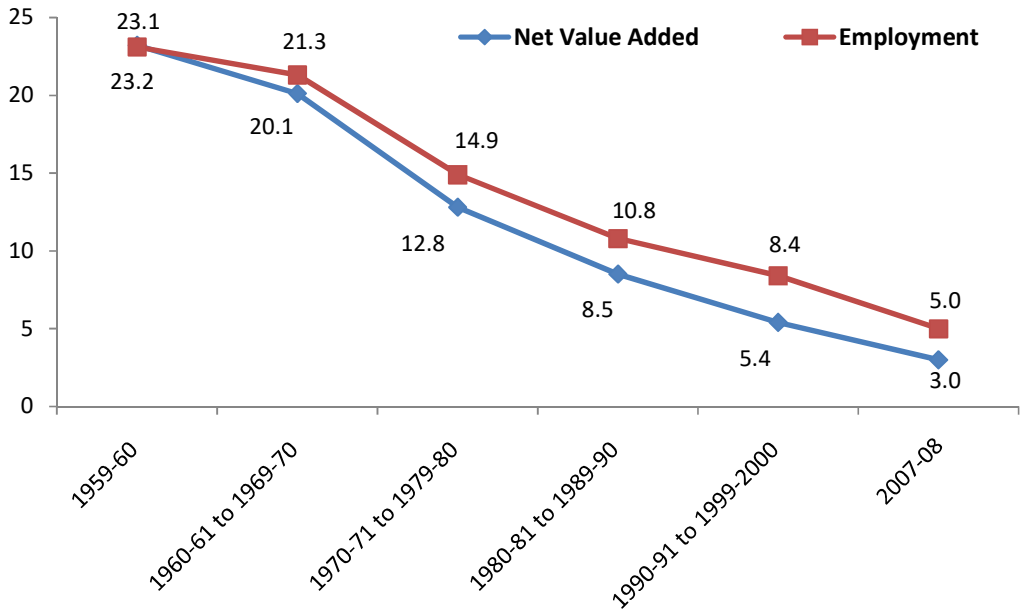
A scrutiny of decennial growth performance in the state shows that the industrial sector in general and the manufacturing sector in particular grew at a very slow rate during the 1970s and the 1980s (Table 6). The growth performance was even more dismal when it is compared with the performance of the sectors at all India level. The rate of growth increased during the first decade of economic reforms, but this was not sufficient enough to mark a resurgence of the sector. However, the growth performance has improved significantly during the last decade and has exceeded the performance of the sectors at the all-India level, particularly before aggravation of farmers' protest against land acquisition at Singur and Nandigram. Two important observations can be cited here. First, rate of growth of production in manufacturing and industry sector has accelerated over the decades. Second, generation of electricity in the state grew at a faster rate since the 1980s, but it failed to boost growth in manufacturing.

The dismal growth performance of the manufacturing sector is reflected in continuously declining share of the state in terms of 'net value added' and employment in the sector at the all-India level. While average share of the state in 'net value added' declined from 20.1 percent during 1960-61 to 1969-70 to a dismal 5.4 percent during 1990-91 to 1999-2000, that in employment decreased from 21.3 percent to 8.4 percent during the same period. Even the high growth rate of the sector during the last decade could not stop this declining trend. Instead, as shown in Figure 25 the share of the state in terms of national 'net value added' and employment in manufacturing declined further to 3 percent and 5 percent respectively in 2007-08.

Table 6: Index of Industrial Production - Compound Growth Rate for West Bengal Vis-À-Vis All-India

Period	Mining & Quarrying	Manufacturing	Electricity	General
1970-71 to 1980-81 (With base 1970-71=100)				
West Bengal	0.01	1.82	1.43	1.62
All-India	4.26	4.05	7.33	4.42
1980-81 to 1992-93 (With base1980-81=100)				
West Bengal	0.10	1.84	8.80	2.23
All-India	6.94	6.41	8.63	6.75
1993-94 to 2000-01 (With base 1993-94=100)				
West Bengal	0.78	3.37	6.59	3.62
All-India	3.98	7.63	6.40	7.20
2000-01 to 2007-08(P) (With base 2004-05=100)				
West Bengal	5.32	13.50	11.10	11.87
All-India	4.34	8.80	4.89	7.93

Sources: Economic Review, Government of West Bengal, various issues.

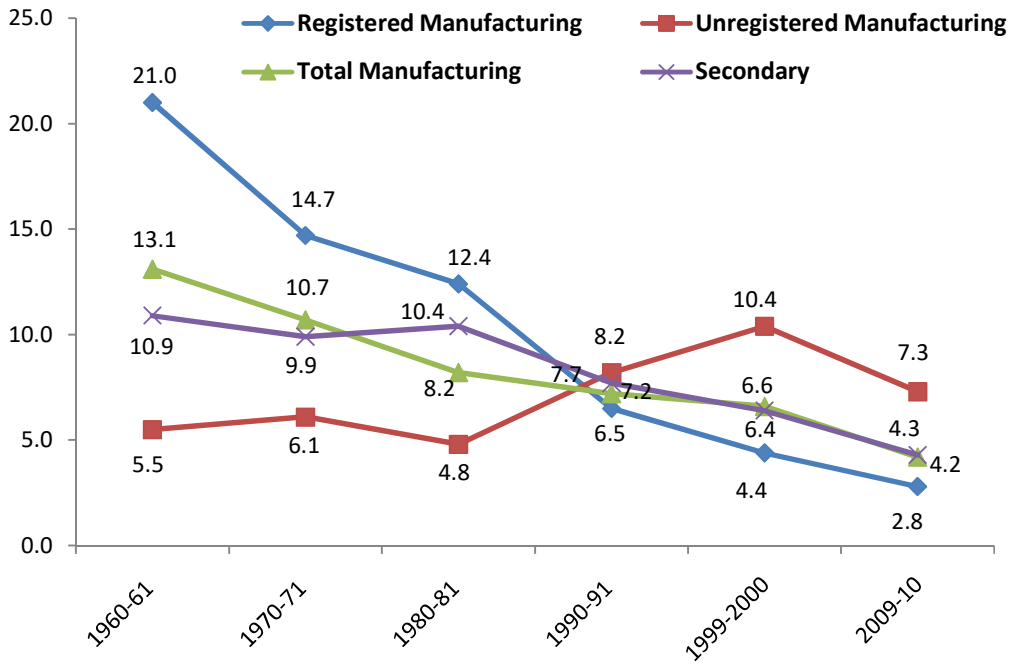


Source: Handbook of Statistics of Indian Economy, RBI, various Issues.

Figure 25: Percentage Share of West Bengal in terms of NVA & Employment

Similarly as shown in Figure 26 the share of manufacturing and secondary sectors in net domestic product (NDP) declined significantly during this period . The contribution of manufacturing to the country's GDP declined from 13.1% in 1960-61 to 4.2% in 2009-10 and that of the secondary sector declined from 10.9% to 4.3% during the same period. Within manufacturing, while share of the registered manufacturing declined quite sharply, that of the unregistered ones increased,

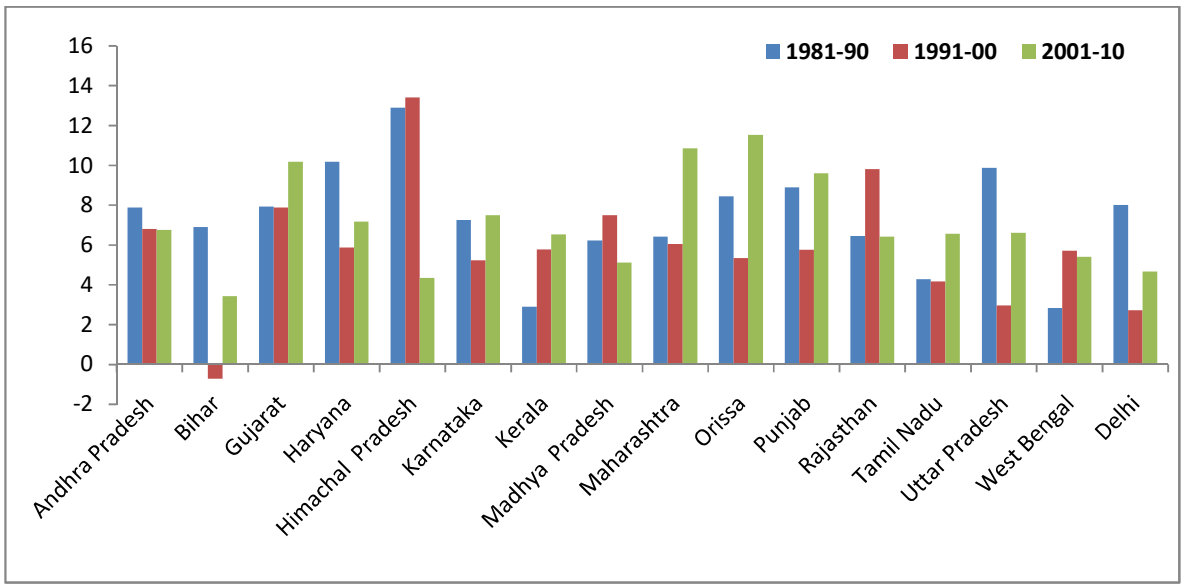
though not very substantially. This means that unorganized manufacturing in West Bengal expanded at a relatively faster rate as compared to other states. The growing importance of unorganized manufacturing in the state is well documented by others (e.g. Bagchi, 1998; Raychaudhuri and Basu, 2007). However, the distinct feature of growth of the unorganized manufacturing is that while at the national level the sector dominates organized manufacturing in terms of employment; in West Bengal, it plays an important role in respect of both output and employment.



Source: National Accounts Statistics, Government of India, various issues

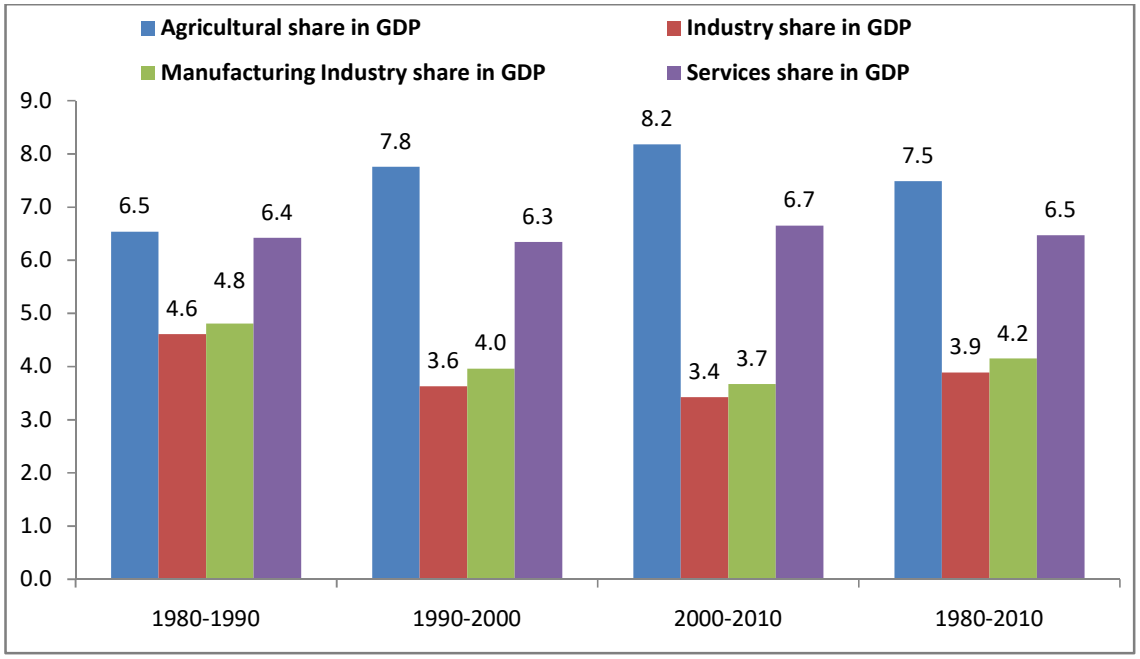
Figure 26: Share Of West Bengal Manufacturing Sector In All-India NDP (%)

Such a declining share of West Bengal in manufacturing and industrial output at the national level may be partly attributed to among others, better growth performance of these sectors in other major states of the country, and on the part of the state on weak policy framework and enabling environment as brought out earlier. For example, share of West Bengal in industry production grew consistently at lower rates as compared to the states like Andhra Pradesh, Gujarat, Haryana, Maharashtra, Punjab, and Rajasthan during 1981-2010 (Figures 27). Further, the rate of growth of the share of the industry sector of Karnataka, Odisha, Tamil Nadu and Uttar Pradesh exceeded that of West Bengal during the last decade. On the other hand, contribution of services to the GDP by and large remained the same during last three decades (Figure 28).



Source: Handbook of Statistics of Indian Economy (2010-11), RBI

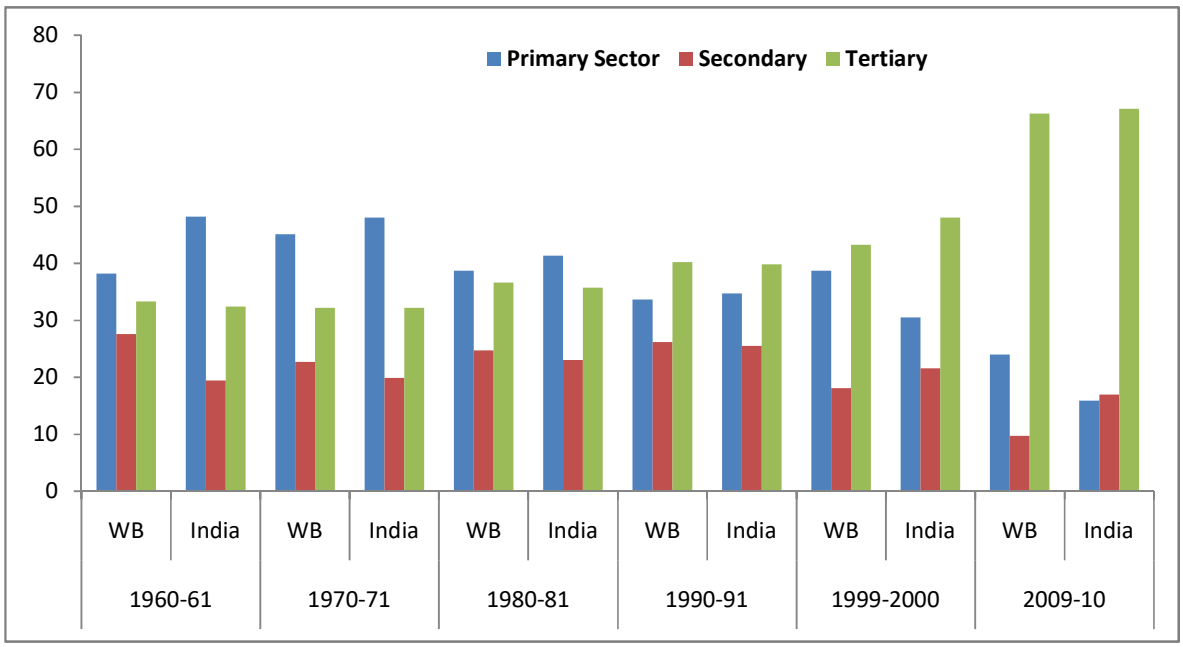
Figure 27: Comparative Growth Performance: Manufacturing and Industrial Output



Source: Handbook of Statistics of Indian Economy (2010-11), RBI

Figure 28: Sectoral Share of West Bengal in GDP

The relatively poor growth performance of the industry sector has altered the composition of NSDP vis-à-vis NDP. While the share of both the primary and the secondary sectors in NSDP has decreased, the decline is quite sharper in the case of secondary sector in general and the manufacturing sector in particular. However, both the levels and the trends are different when the composition of GDP is seen (Figure 29).



Source: Handbook of Statistics of Indian Economy, RBI, Various Issues

Figure 29: Composition of NSDP of West Bengal vis-à-vis all India NDP

3.3 Industrial Investment Scenario in West Bengal in Post-Reforms Period

Despite dismal growth performance of the existing industrial units, especially when compared with other major states of the country, many new projects have been implemented in West Bengal in the post-reform era. In terms of investment proposals received, currently West Bengal ranks 8th amongst the major states (Figure 30). Implementation of new projects has witnessed acceleration especially during the last decade, hence creating scope for more industrial production and employment in the state. As many as 2531 new projects have been implemented in the state during 1991 to 2010 with an investment of Rs. 65,685 crore and which has created direct employment opportunity for 297,808 persons (Table 7). A distribution of these new projects by industry categories reveals that nearly 50% of the projects are in the sectors like iron and steel, drugs, chemicals and pharmaceuticals involving around 75% of investment (Table 8). Interestingly, around one-fourth of the new units are in agro-based and food-processing industries, but their average share in total investment during 1998-2009 was only 9%. However, over the years importance of this industry segment has increased. For instance while around 13% of the new units established during the 1990s were in agro-processing, its share has increased to 26% during the last decade. Similarly, the share of this industry in new investment has increased from 2.50% to 9% during the same period. On the other hand, relative position of jute and textilesindustries in terms of both number of units and amount of investment has declined during the last decade.

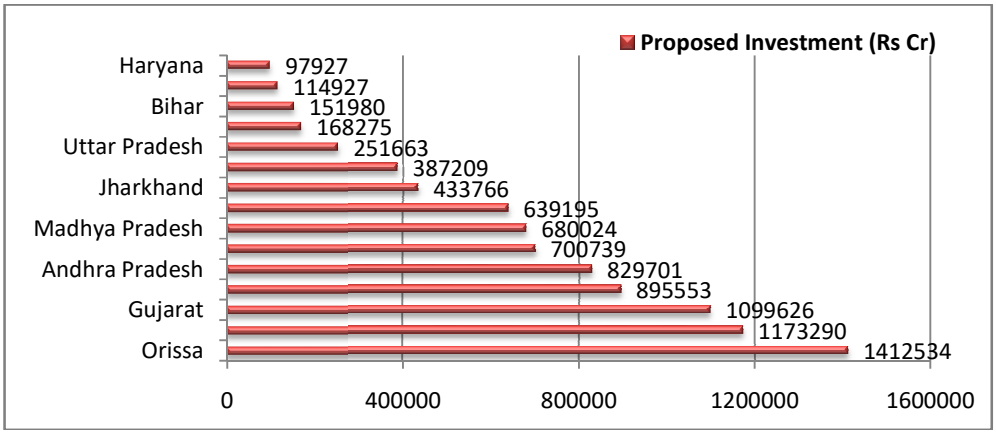


Figure 30: State-wise Share of Proposed Investments for Industries

Table 7: Industrial projects implemented in West Bengal

year	No. of units	Investment catalyst	Direct employment
1991-2000	459	17580.71	62404
2001-2010	2072	48104.19	235404
Total	2531	65684.90	297808

Source: Annual Report 2010-11, Department of Commerce and Industries, Government of West Bengal

West Benagal's position is much better in terms of its share in Industrial Entrepreneur Memorandum (IEMs) implemented. It ranks 4th in terms of number of projects implemented and 3rd and 4th in respect of amount of investment and employment generated therefrom. A high of 755 projects have been implemented with total investment of Rs. 32,303 crore and employment generation of 138,576 persons. In this regard the state stands much ahead of many of the favourable investment destinations like Odisha and Chhattisgarh (RBI, 2012).

Table 8: Distribution of Implemented Projects by Major Industries, 1991-2010

Sectors	1991-98		1999-2009	
	Units	Investment	Units	Investment
Agro based & food processing	12.66	2.53	26.09	9.07
Iron & steel	18.33	63.20	21.22	21.27
Jute & textiles	11.33	12.81	6.60	2.46
Engineering	8.00	4.20	5.55	5.36
Electronics & electrical	8.00	2.75	1.78	3.14
IT & ITES	10.33	1.42	7.65	4.38
Drugs, chemicals & petrochemicals	24.33	11.90	26.87	49.53
Others	7.00	1.19	4.24	4.80
Total	100.00	100.00	100.00	100.00

Source: Annual Report, 2010-11,

3.4 Composition of Manufacturing Sector in West Bengal

Decaying of many of the traditional industries like jute and textiles, and greater investment inflows in sectors like food-processing has to some extent altered the relative position of different industries in the factory sector of West Bengal. As in 2007-08, majority of the factories in the state belonged to food and beverages followed by metals, machinery and equipment, tobacco and related products, chemicals, and rubber and plastics (Table 9). On the other hand, basic metals has the highest share in invested capital and value of output followed by chemicals and chemical products, whereas textiles contributes the most to employment generation followed by basic metals and food products and beverages.

When contribution of different factories to corresponding sectors at national level is considered, it is observed that 13% of the total factories producing tobacco and related products are located in West Bengal. But these units do not have any significant contribution to total capital investment, output produced or employment generated. On the other hand, factories belonging to industries like textiles, wood and wood products and basic metals have reasonably high share in total employment generated (Table 10). The factories that produce wood and wood related products are not so large in number but they contribute significantly to total value of output and net value added.

Table 9: Industry-wise (2-digit level) share of selected characteristics in factory sector of West Bengal, 2007-08 (Percent)

Industries	No. of Factories	Invested capital	No. of Workers	Total Persons engage	Total inputs	Value of Output	Net Value Added
Food Product and Beverages	21.23	8.04	12.09	12.24	11.47	10.71	5.97
Tobacco and Related products	6.88	0.59	2.63	2.52	0.94	0.95	1.12
Textile Products	4.89	6.55	40.02	35.06	5.19	6.22	12.96
Wearing Apparel, Dressing and dyeing of Fur	0.55	0.18	0.38	0.43	0.27	0.28	0.38
Leather and related products	3.88	1.77	1.63	1.78	1.79	1.74	1.44
Wood and wood products	2.97	0.99	1.35	1.41	1.43	1.35	0.93
Paper and paper products	1.95	0.87	1.03	1.13	0.62	0.61	0.51
Publishing and printing related activities	2.46	1.33	0.90	1.29	0.80	1.02	2.39
Coke, petroleum products and nuclear fuel	1.14	9.20	1.01	1.10	16.53	14.94	6.17
Chemical and chemical products	5.68	22.00	3.22	4.62	14.24	14.12	12.22
Rubber and plastic products	5.38	1.59	1.72	1.96	1.56	1.53	1.17
Non-Metallic Mineral Products	3.46	2.12	2.32	2.41	1.92	2.24	4.18
Basic Metals	9.45	31.95	17.22	17.12	29.70	30.14	32.63
Fabricated metal products	6.81	2.15	2.60	3.02	2.14	2.15	2.33
Machinery and Equipment	7.30	1.80	2.29	3.11	2.10	2.21	3.02
Office, Accounting and Computing Machinery	0.10	0.35	0.07	0.12	1.49	1.34	0.58

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Industries	No. of Factories	Invested capital	No. of Workers	Total Persons engaged	Total inputs	Value of Output	Net Value Added
Electrical machinery and apparatus	3.96	1.96	2.20	2.55	2.85	3.02	4.33
Radio, TV and communication equipment	0.55	0.33	0.49	0.39	0.22	0.26	0.46
Medical, Precision and Optical instruments	0.73	0.59	0.37	0.48	0.75	0.78	1.00
Motor vehicles, trailers and semi-trailers	0.48	0.18	0.89	0.92	0.29	0.26	0.10
Other transport equipments	1.75	1.64	2.82	2.89	1.68	1.85	3.17
Furniture and other manufacturing	0.79	0.21	0.30	0.33	0.19	0.19	0.16
Other	7.58	3.63	2.44	2.99	1.82	2.09	2.81
All	100.00	100.00	100.00	100.00	100.0	100.00	100.0

Source: Annual Survey of Industries (2011)

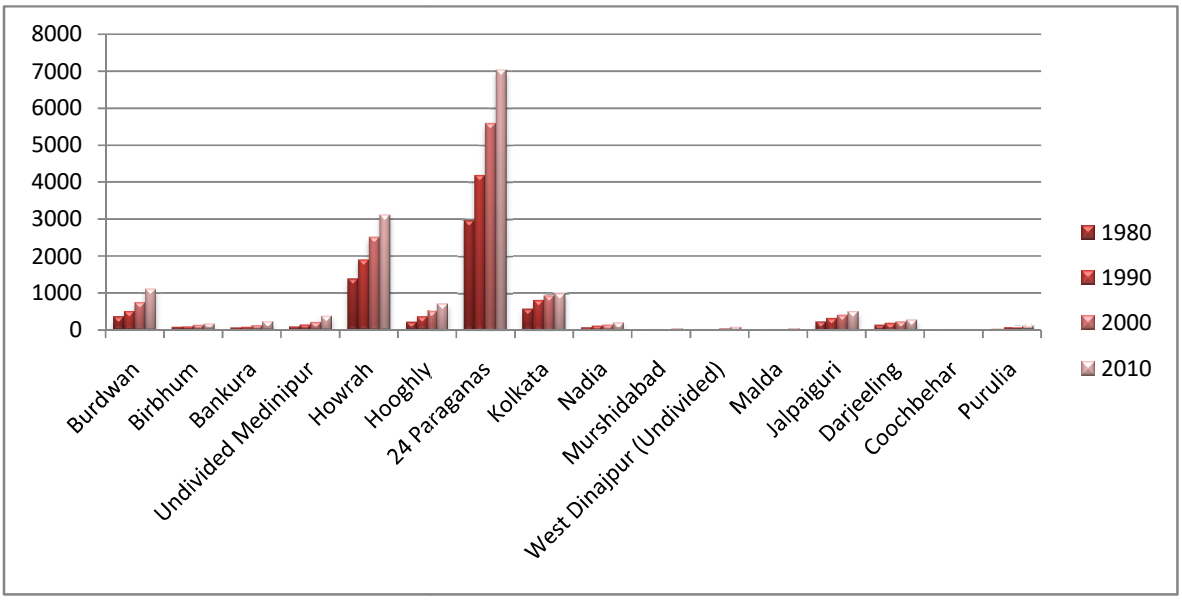
Table 10: Share of various industries of West Bengal towards selected characteristics in India (2digit level), 2007-08 (percent)

Industries	No. of Factories	Invested capital	No. of Workers	Total Persons engaged	Total inputs	Value of Output	Net Value Added
Food Product and Beverages	4.85	2.94	4.32	4.19	3.58	3.48	2.42
Tobacco and Related products	13.03	5.74	2.81	3.13	10.80	7.24	2.60
Textile Products	2.28	3.03	13.56	12.39	3.53	4.09	8.09
Wearing Apparel, Dressing and dyeing of Fur	0.90	0.60	0.30	0.35	0.99	0.91	0.70
Leather and related products	8.63	9.93	3.63	4.15	8.07	8.00	7.27
Wood and wood products	5.57	14.56	10.84	10.69	21.77	20.52	14.24
Paper and paper products	2.86	1.58	2.07	2.32	2.04	1.88	1.19
Publishing and printing related activities	4.42	5.59	4.19	4.59	4.67	4.88	5.61
Coke, petroleum products and nuclear fuel	6.45	4.11	4.91	5.23	4.19	3.75	1.34
Chemical and chemical products	3.04	6.44	2.22	2.67	5.78	5.13	2.81
Rubber and plastic products	3.93	2.39	2.63	2.80	2.24	2.13	1.42
Non-Metallic Mineral Products	1.31	1.46	1.77	1.85	3.00	2.56	1.87
Basic Metals	7.27	7.03	11.55	10.91	8.66	7.91	5.24
Fabricated metal products	4.13	2.61	2.70	2.99	2.56	2.44	1.92
Machinery and Equipment	4.47	1.54	2.48	2.84	1.74	1.68	1.49
Office, Accounting and Computing Machinery	3.45	3.67	1.76	2.09	14.47	12.53	4.88
Electrical machinery and apparatus	5.52	2.82	3.78	3.91	3.26	3.18	2.91
Radio, TV and communication equipment	3.11	0.85	2.08	1.48	0.58	0.64	0.95
Medical, Precision and Optical instruments	4.53	4.69	2.75	2.89	5.89	5.04	3.00
Motor vehicles, trailers and semi-trailers	0.88	0.14	1.03	1.01	0.20	0.18	0.06
Other transport equipments	5.64	4.28	7.38	7.27	3.52	3.63	4.31
Furniture and other manufacturing	1.87	0.60	0.73	0.78	0.33	0.34	0.34
Other	7.53	3.03	7.61	7.15	2.37	2.63	3.21
ALL	4.09	3.97	5.14	4.94	4.17	3.94	2.94

Source: Annual Survey of Industries (2011)

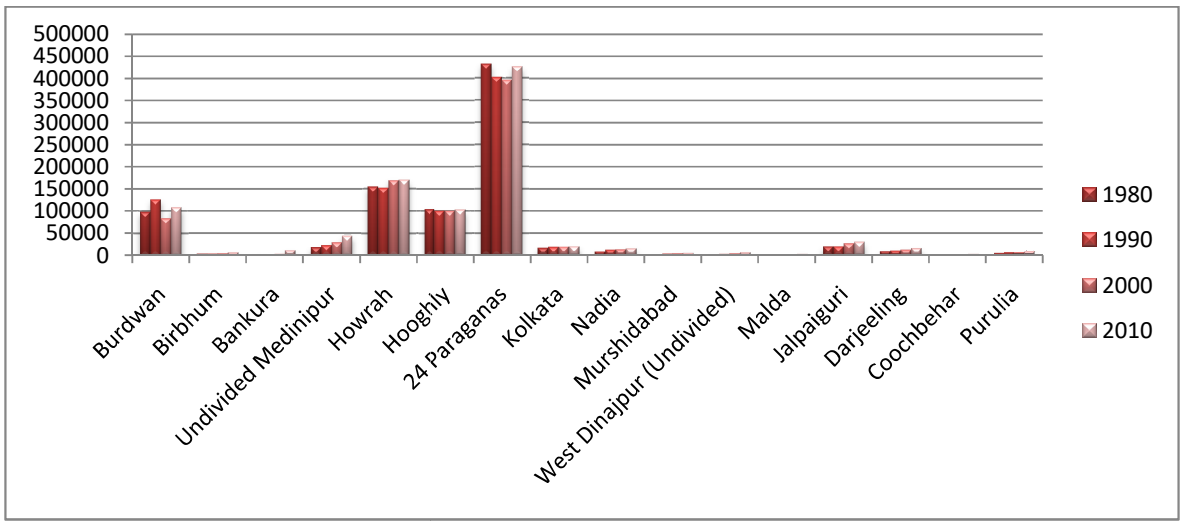
3.5 Geographical Distribution of Industrial Units

Distribution of the registered factories in West Bengal is highly skewed in three districts namely Howrah, and the North and South 24 Parganas. Nearly two-third of the registered factories are located in these three districts (Figure 31) with more than 60% of the workforce engaged in the registered manufacturing sector. The other two districts that have reasonable presence of registered manufacturing units are Burdwan and Kolkata. These two districts account for around 14% of the units and 13% of the employed workforce (Figure 32). Almost all of the above mentioned districts also comprise some of the most urbanised and densly populated parts of the state as described in the earlier section of this report.



Source: Bureau of Applied Economics and Statistics, Government of West Bengal

Figure 31: District-wise No. of Registered Factories in West Bengal, 1980-2010



Source: Bureau of Applied Economics and Statistics, Government of West Bengal

Figure 32: District-wise Employment Opportunities in West Bengal, 1980-2010

However, distribution of the registered micro and small enterprises across the districts is relatively more even. In addition to Howrah, the two '24 Parganas', Burdwan and Kolkata, the districts like Birbhum, undivided Midnapore, Nadia, Murshidabad and Jalpaiguri also have reasonable number of registered micro and small enterprises. More importantly, majority of the units are located in Kolkata. Recently a number of growth centres have been developed by the state wherein all teh required infrastructure viz. power, land, watersupply etc. are made available. In addition three mega growth centers, each in the districts of Birbhum, Jalpaiguri and Malda, are also proposed (table 11).

Table 11: Number of registered factories and corresponding employment in Micro and Small Scale Enterprises in districts of West Bengal,1980 to 2010

Districts	1980		1990		2000		2010	
	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)
Burdwan	1646 (12.88)	3484 (3.48)	2737 (9.59)	13852 (8.49)	625 (7.26)	4727 (8.88)	636 (6.30)	6053 (4.96)
Birbhum	553 (4.33)	5061 (5.06)	713 (2.5)	3946 (2.42)	175 (2.03)	1592 (2.99)	308 (3.05)	4779 (3.92)
Bankura	450 (3.52)	3110 (3.11)	929 (3.26)	4899 (3.00)	358 (4.16)	1954 (3.67)	185 (1.83)	1840 (1.51)
Undivided Midnapore	1231 (9.64)	10451 (10.45)	3658 (12.82)	17915 (10.98)	1058 (12.3)	4811 (9.03)	858 (8.5)	6944 (5.69)
Howrah	1198 (9.38)	10163 (10.16)	2338 (8.19)	10097 (6.19)	539 (6.26)	3243 (6.09)	1510 (14.95)	14381 (11.79)
Hooghly	692 (5.42)	8638 (8.64)	1719 (6.02)	11789 (7.23)	425 (4.94)	4979 (9.35)	478 (4.73)	5846 (4.79)
24 Paraganas	1503 (11.77)	19306 (19.31)	5907 (20.7)	36883 (22.61)	1277 (14.84)	9603 (18.03)	1256 (12.44)	25100 (20.58)
Calcutta	1881 (14.72)	13532 (13.53)	2825 (9.9)	20563 (12.61)	1440 (16.74)	9152 (17.19)	1804 (17.86)	20346 (16.68)
Nadia	387 (3.03)	2290 (2.29)	1365 (4.78)	6473 (3.97)	345 (4.01)	1283 (2.41)	330 (3.27)	3520 (2.89)
Murshidabad	637 (4.99)	2763 (2.76)	1370 (4.8)	6275 (3.85)	836 (9.72)	3360 (6.31)	304 (3.01)	23320 (19.12)
West Dinajpur (undivided)	269 (2.11)	1634 (1.363)	727 (2.55)	3962 (2.43)	316 (3.67)	1749 (3.28)	154 (1.52)	1878 (1.54)
Malda	725 (5.68)	3488 (3.49)	854 (2.99)	5056 (3.1)	351 (4.08)	1222 (2.29)	180 (1.78)	1952 (1.6)

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Districts	1980		1990		2000		2010	
	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)	No. of Registered Factories (%)	Workers Employed (Avg. daily) (%)
Jalpaiguri	273 (2.14)	1712 (1.71)	1408 (4.93)	8092 (4.96)	272 (3.96)	1923 (3.61)	431 (4.27)	2111 (1.73)
Darjeeling	507 (3.97)	8999 (9)	773 (2.71)	6180 (3.79)	176 (2.05)	910 (1.71)	179 (1.77)	1414 (1.16)
Coochbehar	270 (2.11)	1562 (1.56)	444 (1.56)	2003 (1.23)	199 (2.31)	1448 (2.72)	179 (1.77)	976 (0.80)
Purulia	553 (4.33)	3808 (3.81)	773 (2.71)	5147 (3.16)	212 (2.46)	1296 (2.43)	207 (2.05)	1484 (1.22)
West Bengal	12775 (100)	100001 (100)	28540 (100)	163132 (100)	8604 (100)	53252 (100)	10099 (100)	121944 (100)

Source: Bureau of Applied Economics and Statistics, Government of West Bengal

3.6 Emerging Industrial Centres in West Bengal

3.6.1 Haldia

Haldia has emerged one of the fastest growing industrial centres of West Bengal. Locational advantages, cargo handling facilities at Haldia dock complex, availability of land, adequate water, intra city roads, communications, etc. have attracted many major investors from within the country and from overseas. The major companies having production units at Haldia include Indian Oil Corporation Ltd, Indian Oil Petronas Ltd., South Asian Petrochem Ltd., Tata Chemicals Ltd., Haldia Petrochemicals Ltd., Mitsubishi Chemical Corporation Ltd., Hindustan Unilever Ltd., Dhunseri Petrochem & Tea Ltd., Shamon Ispat Ltd., etc. In addition, West Bengal Industrial Development Corporation (WBIDC) and Tata Steel have set up a joint venture for setting up a Merchant Coke Oven Plant to generate 0.8 million tones of coke annually in Phase-I and also 60 MW of power. A mega chemical industrial estate has also been proposed on 10,000 acre of land.

3.6.2 Kharagpur

Kharagpur has emerged as yet another important industrial town in West Bengal. Kharagpur is located in the Paschim Medinipur district of West Bengal. It promises to be an ideal destination for investment due its proximity to Kolkata and also because of its good connectivity with other parts of the country by rail and road. Further, the Haldia Dock Complex is only around 120 km away from this place which offers a strategic advantage. Medinipur-Kharagpur Development Authority (MKDA) has also made major investment in improving road connectivity in the area.

Some of the existing major industrial units located around Kharagpur include ASO Cement Ltd. (slag cement), Flender MacNeill (industrial gears), Humboldt Wedag (I) Ltd. (slurry pumps), South-

Eastern Railway Workshop (carriage, wagon, diesel locomotive maintenance), Tata Bearings Ltd. (bearings and its castings), Tata Davy Ltd. (heavy engineering), Tata Metaliks Ltd. (pig iron plant), Wellman Wacoma Ltd. (coke oven/metallurgical coke), Rashmi Metaliks (Pig iron manufacturing unit). In addition, ASO Cement Ltd. has planned to expand its cement manufacturing unit, and Century Iron and Steel Industries Ltd. has planned to set up pig and sponge iron units in this region. Similarly, ACC Cement has a plan to set up a greenfield cement manufacturing unit, and many other projects are likely to up come in the area. A number of industrial organisations have also been allotted land in this area for setting up their factories in divirse segments of manufacturing.

In addition Table 12 shows initiatives that have been taken to set up a number of industrial parks across the state particularly in the basin districts. Expected units in these parks will comprise diversified manufacturing in, among others, foods processing, polymer products, rubber products, steel, garments, etc.

Table 12: Details of Proposed Industrial Parks and SEZ in the State

Name	Products / Services	Location
Food Park (Phase I & II)	Food processing	Sankrail, (Howrah)
Poly Park	Polymer products	Sankrail, (Howrah)
Rubber Park	Rubber footwear, hoses, tubes, automotive rubber products	Sankrail, (Howrah)
Biotech Park	Biotechnology projects	Dewanmara (Paschim Medinipur)
Plasto Steel Park (Phase - I & II)	Iron and steel and plastic products	Borjora (Bankura)
Iron & Steel Park	Steel products	Kharagpur (Paschim Medinipur)
Iron & Steel Park	Steel products	Jhargram (Paschim Medinipur)
Foundry Park	Castings, forge and foundry products	Howrah
Manikanchan SEZ	Gems and jewellery	Salt Lake, Kolkata
Shilpangan	Light engineering products	Salt Lake, Kolkata
Apparel Export Park	Garments, buttons, accessories, washing/ processing	Uluberia, (Howrah)
The Garment Park	Garments	Kolkata

Source: www.ibef.org/download/Westbengal_171109.pdf



3.7 Implications of Industrialization for the Ganga River Basin

While greater inflows of investment are necessary for revival of the state's economy in general and of the industry sector in particular, industrial pollution in the state remains a critical issue. The study conducted jointly by the Central Pollution Control Board (CPCB) and Indian Institute of Technology Delhi on Comprehensive Environmental Pollution Index (CEPI) for assessment of pollution load of industrial areas, reveals that West Bengal has the highest number of red category industries causing high pollution, followed by Maharashtra and Tamil Nadu. The state has 12,810 red category industries, whereas the numbers in Maharashtra and Tamil Nadu are 12,184 and 11,650 respectively. Majority of these red category industries are located in the industrial clusters of Haldia (Dist. Purba Midnapore), Howrah (Dist. Howrah) and Asansol (Dist. Burdwan) in the River Ganga basin. As shown in Table 13, with the CEPI index of more than 70, all these three areas are found to be on high alert situation with respect to polluting the surrounding environment.

Table 13: CEPI status in the three industrial centres of West Bengal
Interim Assessment of CEPI-2011

S. No.	Industrial Cluster/Area	District	AIR EPI	WATER EPI	LAND EPI	Overall CEPI
1	Asansol	Burdwan	64.38	43	43	70.96
2	Haldia	Purba Midnapore	65.75	70.5	47.5	79.71
3	Howrah	Howrah	62.5	63	60	76.88

Source: Central Pollution Control Board study, 2009

The volume of sewage generated in these cities was found to be much higher than the installed treatment capacities leading to a steady fall in the quality of water in the corresponding stretches of River Ganga. As mentioned earlier, Kolkata has got only around 28% capacity and Howrah has

got 47% capacity to treat their sewage . Hence, everyday a large volume of sewage remains untreated and is discharged into River Ganga.

As regards industrial pollution it was found that the volume of effluents released into River Ganga is the highest in North 24-Parganas followed by Burdwan and Hooghly. The BOD level after treatment of effluents is also very high in these districts. South 24-Parganas and Hooghly are bestowed with chemical industries, which discharge a fairly large volume of effluent into the river. The cement or iron and steel industries located in some districts also pollute the river on a continuous basis. In the case of Dist. Nadia the main polluting industries that discharge into River Ganga comprise food processing and textile industries. (table 15).

Table 14: Effluent Discharged Into the River Ganga

Districts	Sub-sector	Number of Units	Materials Produced	Effluent	
				Quantity (MLD)	BOD after Treatment
North 24 Paraganas	Distillery, Paper, Aluminium, Rubber, Plastic, Leather, Acid, Electronics, Printing Press & Hotel	Exide Industry, Chord Rd. , Hindusthan Heavy Chemicals, Jaysree Chamicals & Fertilizers, Infar(India),Hindustan Lever, B & M Chemicals, Nicco Corpn., Rifle Factory, Reliance Jute, Metal & Steel Factory	Lead Acid Battery, Salfuric Acid, Caustic & Hcl, Sodium Silica, Fluorid, Silica Phosphate etc., Steroid & Bluk Drug,Veg. Oil, Chemical, SteelWire, Ordinance, Jute, Heavy Metal & Steel	4101.35	681.61
South 24 Paraganas	Alumunium, alloy steel, Plastic & Rubber	Bata India, IFB Agro-Industries	Shoes, Distillery	2.66	>100
Burdwan	Paper, Engineering,	Durgapur Steel Plant, Alloy Steel	Iron & Steel, Steel & Alloys,	669.57	8877.76

Districts	Sub-sector	Number of Units	Materials Produced	Effluent	
				Quantity (MLD)	BOD after Treatment
Hooghly	Alumunium, Foundry, Iron Casting, Pipes & Tubes, Steels, Paper, Soft Drink, Rice Barn Oil, Floor Mills, Cold Storage & Fly ash Brick	Hind Motor, Kusum Products,ICI Ltd., Phosphate Ltd., Dunlop India, NALCO Chemicals, Waldies Ltd., Tribenl Tissues ITC Ltd., Keshoram Rayon, Black Diamond Beverages, Standard Pharmaceuticals	Engineering, Veg Oil, Chemical, Fertilizer, Rubber, Chemical, Pulp & Paper, Bottling Plant, Pharmaceutical	214.70	1439.62
Howrah	Steel, Industrial Glass, Food Products & Floor Mills	Aasiatic Oxygen & Acetylene, Berger Paints, Shalimar Paints, Seth Chemical, C & W Workshop	Chemical, Paints, Dye, Engineering	25.82	<100
Kolkata	Steel Foundry, Engineering Industry & Printing	Eastern Distillery, Keshoram Cotton Mill, Stone India, GEC,AEI Works, ESAB India, ELMI, Hindustan Lever, Rosol Ltd., Black Diamond Beverages, Gun & Steel Factory	Distillery, Taxtiles, Engineering, Electrical Lamps, Soaps Detergent etc., Veg Oil, Soft Drinks, Ordance	4.27	845.00
Malda	Industrial Gas, Synthetic Fybre, Jute, Floor Mill & Paper				
Purba Medinipur	Acrylic Fibre, Ball Bearing,	Unitech Paper Mill, Excide	Paper & Pulp, Storage Battery,	20.25	271.37

Districts	Sub-sector	Number of Units	Materials Produced	Effluent	
				Quantity (MLD)	BOD after Treatment
Murshidabad	Electronics, Edible Oil, Steel Based Product, Pharmaceuticals, Food & Fuel & Synthetic Fibre				
Nadia	Chemicals, Paper, Rubber, Alloy Steel, Industrial Gas, Fodder, Yeast, Lamp Filaments & Cold Storage	United Breweries, Supreme Paper Mill, Jenson & Nicholoson, Ramswarup Inds, Corpn, Nicco Corpn. Ltd., Aromate Pvt. Ltd., Alchrome Chemical Industries	Fermentation Industry, Plup & Paper, Paint, G.I.Wire, Telephone Cable, Chemicals	1.47	28.95

Another major concern of the industry sector in West Bengal is related to the location of many thermal power plants on the banks of River Ganga. There are four major power plants located at Farrakka, Bandel, Titagarh and Budge Budge. While the power plants at Titagarh and Budge Budge are under the Calcutta Electricity Supply Corporation (CESC), that at Farakka and Bandel are under the National Thermal Power Corporation (NTPC) and the West Bengal Power Development Corporation Ltd. (WBPDCL). The entire ash is utilized at the Budge Budge and Titagarh plants. However, the rates of utilization at Farakka and Bandel plants are only 60% and 43.6% respectively (Table 15).

Table 15: Fly Ash utilization in Ganga River Basin Area of West Bengal during 2005-06

Name Capacity	Capacity (MW)	Coal Cons. (mta)	Ash Gen. (mta)	Ash Uti. (mta)	% utilisation
Budge Budge, CESC	500	2.52	0.91	0.91	100.0
Titagarh , CESC	240	1.17	0.33	0.33	100.0
Farrakka, NTPC	1600	9.26	3.43	2.06	60.1

Name Capacity	Capacity (MW)	Coal Cons. (mta)	Ash Gen. (mta)	Ash Uti. (mta)	% utilisation
Bandel, WBPDCL	530	1.29	0.41	0.18	43.6

Source: Status of Water Supply, Waste Water Generation and Treatment in Class-I cities of India, Central Pollution control Board, 2010

A majority of the registered manufacturing units in the state are located in four basin districts, viz. Howrah, 24-Parganas, Kolkata and East Midnapore. In particular, at Haldia of Purba Medinipur district, there are many chemical and petrochemical units including the refinery of Indian Oil Corporation, terminals of Bharat Petroleum Corporation and Hindustan Petroleum Corporation, and the dock complex of Kolkata Port Trust. Such heavy concentration of industrial units including chemical and petrochemical factories, refineries and dock complex has significant adverse impact on quantity and quality of water at River Ganga.

Similarly, West Bengal is the leading exporter of finished leather goods. Around 25% of the country's leather goods are exported from the state. West Bengal accounts for almost 4% of India's production of petroleum products and 13% of the country's polymer production. West Bengal has also emerged as a favourite destination for the steel industry.

There are plans to develop a 40 km industrial corridor from Asansol to Raghunathpur, much on the lines of Delhi-Mumbai corridor to make Raghunathpur the next investment destination in the state. This is very important as many of the leading enterprises like Jai Balaji Group, Shyam Steel, Reliance Group including Damodar Valley Corporation have shown interest to set up their units in this area. In addition, there is also a plan to set up industrial clusters on both sides of the four-lane expressway between Raghunathpur to Asansol. As a step forward, the state government has already set up Raghunathpur Planning Authority and talks are on to form Raghunathpur Development Authority. Similarly, there are plans to make Kharagpur and Siliguri as other important industrial centres of the state. Such geographical diversification in location of industrial units is expected to limit pollution pressure on river Ganga.

Given that West Bengal is the largest producer of rice, pineapple, vegetables and fruits in the country, the second largest producer of potatoes and lychees, and substantial producer of spices, coconut, cashew nut, areca nut, betel vine and oilseeds, it has huge potential in the area of agro-processing industry. Some of the major enterprises in the area of agro-processing include Ascon Agro PE & B Pvt. Ltd., Del Monte Pacific Ltd, Dabur Limited, Frito-Lay (a division of PepsiCo), etc. In addition, multinational companies like Unilever and Nestle have also expressed their interests to set up food-processing units in the state. Favourable consequences of such steps are that the discharges of these agro-processing industries are far less as compared to the chemical and petro-chemical plants. However, certain necessary measures such as installing of sewage and industrial effluent treatment plants needs to be taken up to contain the quantity of pollutants that will be discharged in to the Ganga. A proper incentive mechanism for industrial diversification and for enhancement/installation of treatment capacities may be of significant help to the state to make use of river water on a sustainable basis.

4. Conclusions

While urbanization and concomitant industrialization are unavoidable in a land scarce state like West Bengal, it is important to ensure that the former is promoted without causing further damage, both direct and indirect, to Ganga river basin. In this context, the following pertinent actionable points may be proposed:

- In the wake of excessive concentration of urban population in and around Kolkata, there is a need to promote small and medium urban industrial centres in other parts of the state to reduce pressure on Kolkata and adjoining areas and also on the Ganga river basin.
- Despite the slow or significantly restricted industrial development in the last three decades or so, West Bengal has witnessed faster rise of urban centres and urban population. On one hand this may be difficult to explain but on the other it can be attributed partly to the lack of adequate productive employment opportunities in rural areas. Creation of adequate non-farm activities in rural areas is likely to put a check on rural-urban migration and consequently, lessen the growth of urban slum population in the state.
- A proper incentive mechanism should be devised to ensure that waste water is recycled or discharged to the river only after treatment. Possibly, a public-private partnership model may work better in all such efforts to keep the river clean and the cities livable.
- Industrial concentration in select places is not only eco-damaging but also has enormous adverse socio-economic impacts. The ongoing efforts towards diffusion of industries across the state may go a long way to save the Ganga river from further pollution.
- As regards development, it is evident that the state needs to reinvent and redefine its policy framework to attract investment towards industrial development.
- There is major need to promote non-farm employment opportunities in rural the rural areas so that on one hand pace of migration to urban areas can be controlled and on the other hand the economic well being of the rural people can be improved.
- There is a need to recognise the emerging smaller Census Towns as ULBs which are hitherto classified as Village Panchayats and provide enabling institutional support system.
- There is an urgent need to strengthen infrastructure and services for, among others, sewage, drainage and solid waste management in all urban centres across the state.
- There is a need to adopt a paradigm shift towards urban sanitation and solid waste management so as to consider appropriate approaches and technologies.

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Status of Urbanization and Industrialization

in Bihar

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology


IIT Bombay


IIT Delhi


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Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRBMP). The overall Frame Work for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRBMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who have contributed directly and those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction

This report presents the trends in urbanization and industrialization in the Lower Ganga River basin and analyzes their implications for the GRBMP, as most of the cities, towns and industrial units in the basin are located at the bank of Ganga, its offshoot canals and its tributaries. These urban centers and industrial units not only draw water from rivers for their various needs but also release untreated sewage and industrial effluents into them, adversely affecting both quantity as well as quality of water in the rivers. It may be further pointed out that even sewage from cities and wastewater discharges from industrial units which are located far away from the river bank also directly or indirectly go to the river through drainage system and heavily pollute it. The accelerated pace of growth of urbanization and industrialization, especially during the last two decades of economic reforms in India, has put enormous pressure on the carrying capacity of the river system.

Since, urbanization, industrialization and the water pollution are inter-related issues; they are required to be addressed in an integrated manner. There are several anthropogenic and socio-economic factors associated with rapid and at times unregulated urbanization and industrialization that affect the quantity and quality of water resources. For example, growth and composition of GDP, household consumption expenditure, pattern of industrialization, production and consumption practices, occupational structure, rural-urban migration, and other socioeconomic-demographic outcomes are some of the important indicators of water demand as well as its degradation. Therefore, in order to prepare a holistic plan for the management of the Gang River Basin Management Plan (GRBMP), this report investigates the trends and pattern of urbanization and industrialization along with the associated factors and their impacts. For the study purpose, the entire GRBMP is divided into three stretches, namely Upper Ganga Basin (Uttarakhand), Middle Ganga Basin (Uttar Pradesh) and Lower Ganga Basin (Bihar and West Bengal). This report exclusively focuses on Bihar.

2. Methodology

This report is based on secondary data drawn from various published sources, which include, among others, Census of India, NSSO reports, Bihar Statistical handbook, Economic survey of Bihar and Annual Survey of Industries (ASI). For some indicators of urbanization and industrialization data from Department of the Economics and Statistics, Ministry of Statistics and Programme Implementation (MOSPI) have been taken.

Analysis of data is done at three levels— state, district and region (bank and non-bank region). The report accounts for all the 38 districts of Bihar. In order to make the analysis more cogent, districts have been further divided into two categories viz., bank districts and non-bank districts. 12 districts are included in bank districts which are on the bank of river Ganga and the rest of the 26 districts which are far from river Ganga are categorized as non-bank districts. The map below shows all the bank and non-bank districts of Bihar.

Figure 1: Districts of Bihar



Source: Developed from the map available at www.mapsofindia.com

3. A Brief Profile of the Lower Ganga Basin (Bihar)

The state of Bihar is located in the fertile Gangetic Plains. It is the ninth largest state of India in terms of area and the second largest in terms of population. It is bounded by Nepal in the north, Orissa in the south, West Bengal in the east and Uttar Pradesh in the west. Bihar lies mid-way between the humid West Bengal in the east and the sub humid Uttar Pradesh in the west. The Bihar plain is divided into two unequal halves by the river Ganga which flows through the middle from west to east. The total area covered by the state of Bihar is 93,596 sq. km. The state is located between 21°-58'-10" N ~ 27°-31'-15" N latitude and between 82°-19'-50" E ~ 88°-17'-40" E longitude.

Bihar is mainly a vast stretch of very fertile flat land. It has several rivers namely Ganga, Son, Bagmati, Kosi, Budhi Gandak, and Falgu – many of which originating in the Himalays in Nepal. Central parts of Bihar have some small hills, for example the Rajgir hills. The Himalayan Mountains are to the north of Bihar, in Nepal and Chota Nagpur plateau lies towards the south**.**

4. Urbanization: Growth and Dimension

4.1 Urbanization in Bihar

Urbanization and urban population growth are pointers towards the change in the occupational pattern of the community, from agriculture and allied livelihoods to industrial and other non-agriculture occupations. However, it is easy to state at the outset that the state of Bihar is predominantly characterized by agriculture based economy and least level of urbanization in the country.

Table 1: Level of Urbanization in Bihar and India for the year 2001 and 2011 (in %)

Year	2001	2011
India	27.81	31.16
Bihar	10.46	11.84

Source: Census of India 2011, Government of India

Bihar is predominantly a rural state with almost 90% of its people residing in rural areas. As per 2011 population census, in terms of urbanization while Tamil Nadu ranks highest with 48.45% residing in urban areas, Bihar at 11.84% stands way below the national average of 31%. As urbanization has become a proxy indicator of economic development, it is also evident that Bihar lies far behind in terms of overall development. Nonetheless, during the first decade of the 21st century urbanization in the state has increased marginally from 10.47% in 2001 to 11.84% in 2011 indicating renewed impetus on economic growth.

Level of urban population across all the districts of Bihar as per Census 2011 is presented in Figure 2 below. As per this the districts can be classified under 5 categories:

- There are 4 districts with urbanization below 4%. Only one out of the four viz., Samastipur (3.46%) is situated near Ganga River.

- In 11 districts urbanization is between 4 to 8.%. Similarly, despite being close to River Ganga, the two districts in this category, viz., Khagaria (5.26%) and Vaishali (6.65%) are characterized by rather low level of urbanisation.

- There are 13 districts which have slightly higher level of urbanization – close to the state average in the range of 8 to 12% . Among these, only 3 districts viz., Buxar, Saran, Katihar are located near River Ganga and the rest are located away.

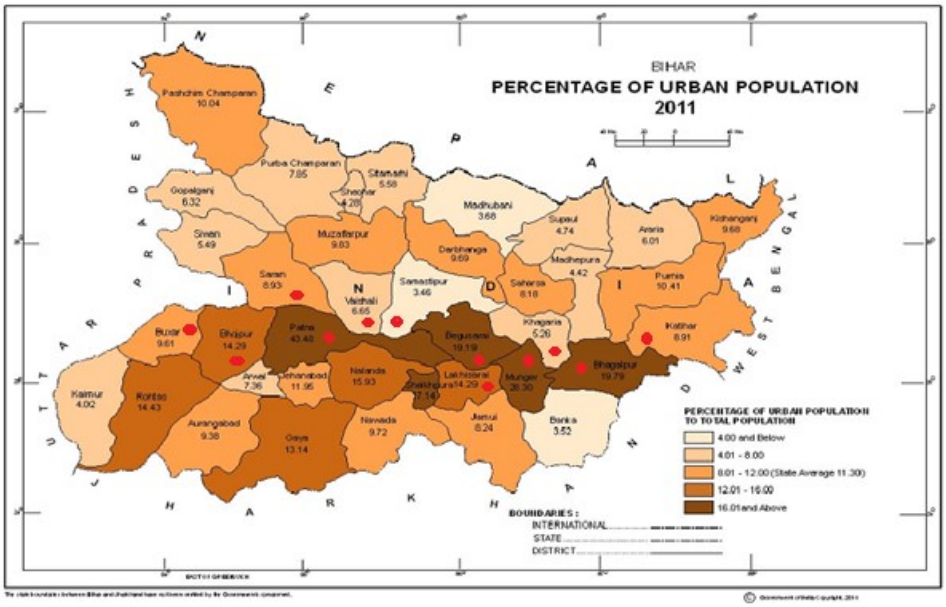
- The next category corresponds to 12-16% urbanization and comprises only 5 districts, out of which only Bhojpur (14.29%) is situated near River Ganga while the rest are located away from the main stream.

- In the remaining 5 districts urbanization is recorded to be over 16%. In this category, 4 of the 5 districts are situated near River Ganga and only one district is located away.

Evidently Patna - the state capital, which also happens to be on the bank of River Ganga represents the highest urbanized district with 43.48% while Samastipur at 3.46% is having lowest level of urbanization. District-wise urbanisation data and classification in bank and non bank districts is presented in Annex/Table A1.

It is noted that only in the highest category (> 16%) most number of districts are found to be located close to the river while in the lower categories there is no such distinct pattern or correlation. It is also noted that only 4 of the 12 bank districts have comparatively higher urbanisation while the rest are around or way below the state average. Thus the hypotheses that proximity to the river is the key factor for economic growth does not seem to emerge clearly in this case. Not questioning the universality of this premise, it indicates significant cumulative investment deficit towards development works across the state in general and industrialisation in particular.

Figure 2: District-wise percentage of Urban Population of Bihar (2011)



Source: Census of India, 2011, Government of India

4.2 Trends and Pace of Urbanization in Bihar

The trend of urbanization in terms of 'statutory' and 'census' towns in Bihar and India over the last decade is presented in Table 2 and depicted in Figure 3. While a 'statutory town' is one which has a notified municipal body, on the other hand a 'census town' is one which has acquired urban characteristics (population > 5000; over 75% of which is involved in non-agriculture occupations; and population density of 400 per sq.km.) but as yet has not been designated as an urban area by the state government and therefore does not have a notified municipal body. It is interesting to note that Bihar has recorded a phenomenal increase of 1100% in the number of so called 'census towns' while the overall number of towns has grown by only 53% (and number of statutory towns increased by 11%). On the national level the corresponding values are 186% and 96% (and 6%) respectively. This indicates that on one hand a fair degree of urbanization is taking place in the smaller or marginal areas of the state and on the other hand there is a major lack of recognition on the part of the state government.

Table 2: Trends of Urbanization in Bihar and India

Census Year	Bihar			India		
	Total Towns	Statutory Towns	Census Towns	Total Towns	Statutory Towns	Census Towns
2001	130	125	5	4041	3799	1362
2011	199	139	60	7935	4041	3894
Increase	53%	11%	1100%	96%	6%	186%

Source: Census of India 2011, Government of India

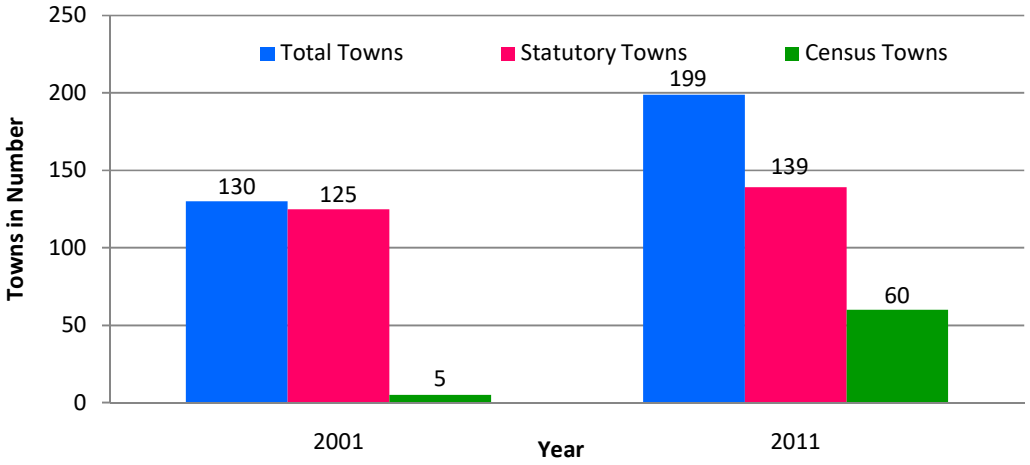


Figure 3: Trends of Urbanization in Bihar for 2001 and 2011

Evidently this trend of rapidly transforming villages into towns without the concurrent recognition and availability of corresponding institutions represents a huge challenge towards provision of urban infrastructure and services. The institutional, infrastructure and services deficit results in poor urban environment, poor quality of life and consequently higher pressure of pollution on, among others, the receiving water bodies in general and River Ganga in particular.

As shown in Table 3 over the last decade from 2001 to 2011 urban population of Bihar has increased by 35% and the number of urban agglomerations has increased from 9 to 12. In a way this appears to be a positive indication for the overall growth of the state as the state recorded GDP growth rate of 18% during 2006-07 and a stunning 11.03% over a 5 year period from 2004 to 2009, making it the second fastest growing state in the country. However, historically the state economy has performed poorly and as a result it came to be recognized with the lowest GDP per capita and which explains the generally low level of

urbanisation across the state as compared to other parts of the country[1]. It is also noted that the overall decadal growth rates for Bihar as well as India have shown declining trends.

Table 3: Urban Population and the Number of Urban Agglomeration (UAs) in Bihar

	Bihar		India	
Year	**2001**	**2011**	**2001**	**2011**
Urban Population (in lakh)	86.79	117.29	2860	3770
Overall decadal growth rate (in %)	28.6	25.1	21.5	17.6
Number of UA	9	12	384	475

Source: Census of India 2001, 2011, Government of India

4.3 Pattern of Urbanization in Bank and Non-bank districts

The pattern of urbanization in the state can be best understood in relation to the proximity of a district to River Ganga (i.e, 'bank' and 'non-bank' districts). Accordingly Figure 4 presents a comparison of the proportion of urban population in the 'bank' and 'non-bank' districts alongside that of the entire state (refer Annex/Table A1 attached to this report for district wise pattern). It is noted that the average percentage of urban population in 'bank' districts is almost double of that in the 'non-bank' districts and it is also consistently higher compared to the state average. From this it appears that proximity to River Ganga is a driver towards growth of the local economy of a district. However, as shown in an earlier section, due to cumulative investment deficit over last several decades, this does not emerge as a strong hypothesis. In this respect it also needs to be recognised that Bihar has been characterised by agrarian economy[2], and therefore it was never primed for urbanization as an harbinger or indicator of growth of its economy.

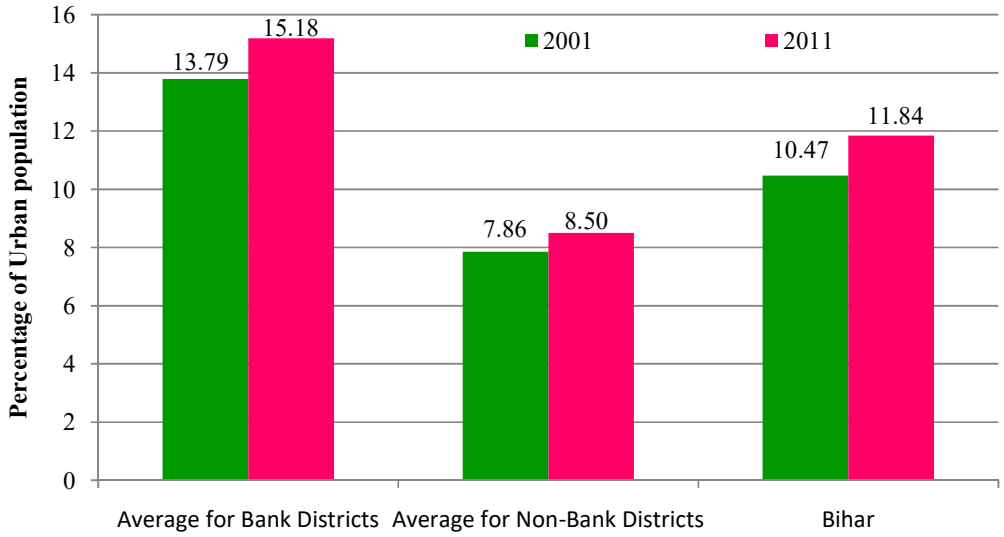


Figure 4: Percentage of Urban Population in Bank and Non-bank districts of Bihar

[1] For instance during 2002-2006 manufacturing sector recorded a growth of only 0.38% and during 1999 to 2008 the state GDP growth was 5.1% as compared to the national average of 7.3%.

[2] As per 2008 data, the economy of the state is characterized by dominance of services sector at 55%, followed by agriculture at 35% while the industrial sector accounts for only 10%.

4.4 Growth Trend in Urban Agglomerations (UAs)

In Census 2001 one of the criteria for UA was minimum population of 20,000; however in Census 2011 this was increased to 100,000. Accordingly as shown in Table 4 and Figure 5, as per Census 2001 there were only 9 UAs in Bihar and the number increased to 12 by 2011. However it is noteworthy that while 6 additional UAs were recognised, the 3 existing UAs of Begusarai, Samastipur and Motihari despite having comparatively fairly large population were derecognised, . Interestingly, it is noted that as per the Census 2011 the number of UAs in the 'non-bank' has gone up from 4 to 7 while it remained unchanged in 'bank' districts which indicates somewhat renewed growth impetus in the case of the former.

Table 4: Urban Agglomerations in Bihar for 2001 and 2011

Sr. No.	Name of the UA	Population (in Number)		Remarks
		2001	**2011**	
A.	**Bank Districts**			
1	Patna	16,97,976	20,46,652	
2	Katihar	1,90,873	2,40,565	
3	Begusarai	1,07,623	2,954,367	Derecognised in 2011
4	Samastipur	61,998	4,254,782	Derecognised in 2011
5	Buxar	83,168	1,10,608	Recognised in 2011
6	Bhagalpur	3,50,133	4,10,210	
7	Saran (Chapra)	179,190	2,12,955	Recognised in 2011
B.	**Non Bank Districts**			
1	Gaya	3,94,945	4,70,839	
2	Purnia	1,97,211	3,10,817	
3	Motihari (East Champaran)	1,08,428	6,43,851	Derecognised in 2011
4	Sitamarhi	87,279	1,05,924	
5	Muzarffarpur	3,05,525	3,93,724	Recognised in 2011
6	Darbhanga	2,67,348	3,06,089	Recognised in 2011
7	Bettiah (West Champaran)	1,16,670	1,56,200	Recognised in 2011
8	Nawada	81,891	1,18,820	Recognised in 2011

Notes:

1. Source: Report on Final Population of Urban Agglomerations and Towns – 2001, Ministry of Urban Development; Census of India 2011, Government of India.

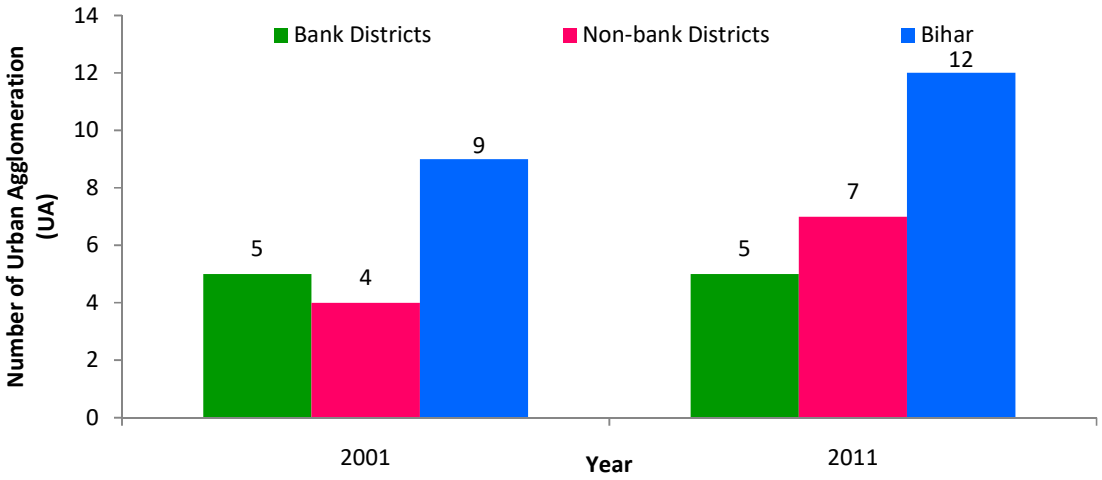


Figure 5: Number of Urban Agglomerations in Bank and Non-bank districts of Bihar for2001 and 2011

4.5 Category-wise Growth of Cities and Towns

The distribution of the number of towns of the state in different population categories is presented in Table 5. As per this, in 2001 almost 85% of the towns were with population below one lakh and slightly over 50% were in the 20-50,000 category. Patna was the only city with a population in excess of 1 million (~ 1.4 million) while the second highest was way below under half million. Census 2011 has identified around 60 hitherto villages which have acquired urban characteristics and where the population is more than 5000.

Table 5: Number of Towns under Population Categories

Category	Population Range	Number of towns (Census 2001)	Number of towns (Census 2001)
I	> 1 Lakh	20	27
II	50,000-100,000	17	NA
III	20,000-50,000	68	NA
IV	10,000-20,000	19	NA
V	5,000-10,000	6	69
VI	< 5,000	None	NA
	Total	130	199

Source: Census of India 2001 and 2011, Government of India

The districts having class I cities are Patna, Vaishali, Saran, Munger, Katihar, Bhagalpur, Bhojpur, West Champaran, East Champaran, Sitamarhi, Purnia, Saharsha, Darbhanga, Muzaffarpur, Siwan, Nalanda, Rohtas and Gaya. The district wise number of towns under different population categories for the year 2001 is given in Annex/Table A2.

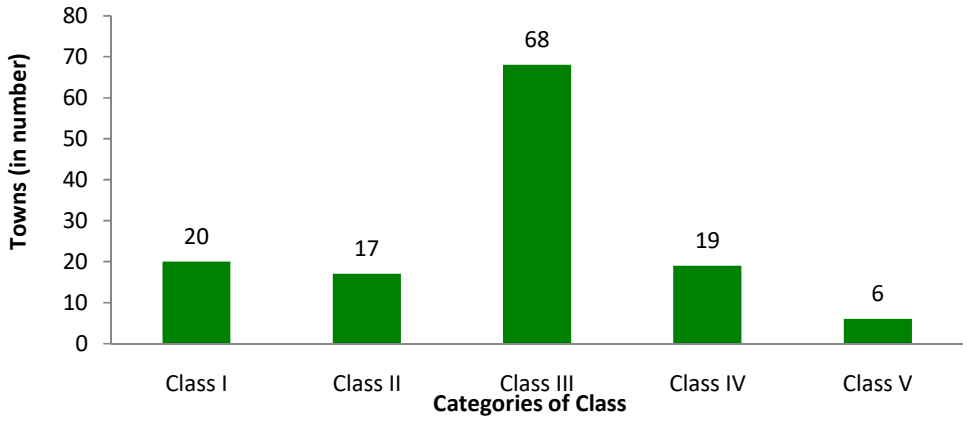


Figure 6: Number of Towns in different Classes of Bihar (2001)

From Figure 7 it is noted that as per Census 2001 there are more numbers of towns in non-bank districts (80) as compared to bank districts (50) and among all population categories the former scored consistently higher. From this it is rather evident that proximity to the River Ganga has not necessarily contributed in inducing urbanisation in the state.

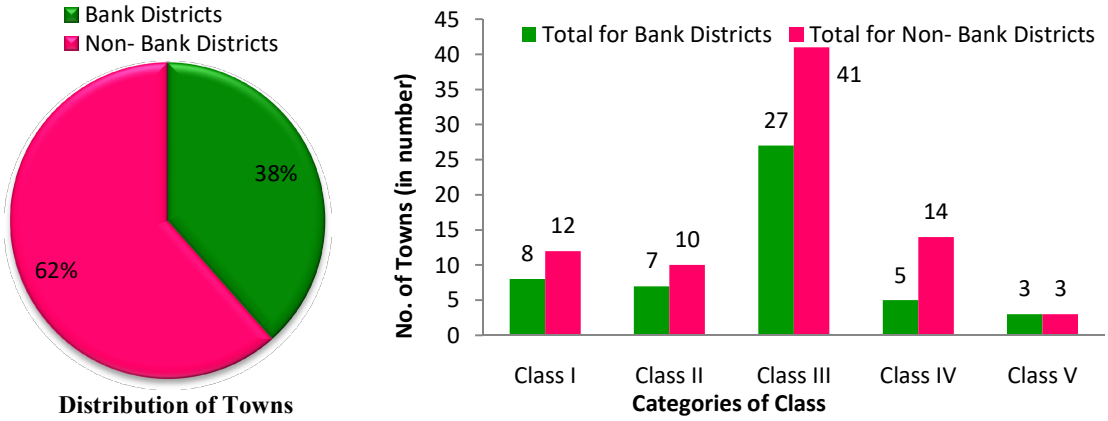


Figure 7: Number of Towns under different Classes for Bank and Non-Bank Districts (2001)

5. Urban Occupational Structure

Household occupational patterns for the years 2004-05 and 2009-10 based on the 61st and 66th round of NSSO are presented in Figure 8. It is noted that while there is not much change in the wage/ salary earners and casual labours, the 'self employed' category has registered a significant increase from 47% to 61.4%. This rise in 'self-employed' could be attributed to, among others, creation of livelihood opportunities in the informal or unorganised sector as a result of the state GDP recording a stunning growth of 11% during 2004-09 period as mentioned earlier. However, this could also be interpreted as job losses in the organised sector on account of other factors.

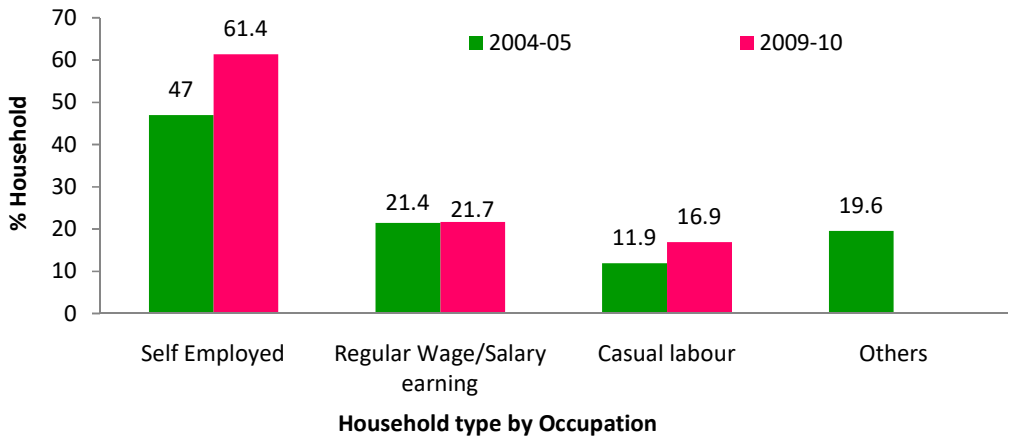


Figure 8: Percentage Distribution of Household by Type of Occupation in Bihar

6. Trends in Migration

As a consequence of changes in the state economy, overtime the nature and pattern of migration has also been changing. Migration may involve either daily commuting from nearby places or permanent shift of residence. Besides this, since the rural migrants are not a homogenous group, the nature and pattern of migration also varies from one social group to another. Among the latter there can be four different streams, viz., rural to rural, rural to urban, urban to urban and urban to rural. In the context of this report, two streams, viz., 'rural to urban' and 'urban to urban' are important which contribute towards urbanisation.

As per the 64th round of NSS Bihar has reported one of the highest rates of out-migration to other states which is 4.4% of urban male and 9.2% of rural male. As shown in Figure 9, in 2001 more than 28 lakh persons migrated out of Bihar to other places whereas about 10 lakh persons came into the state. Large out migration can be attributed to very high level of poverty (urban poverty ratio 43.7%), lack of employment opportunities in the services sector, lack of investment in industrial and infrastructure sectors and the fact that labour from the state has been in demand in distant centres of economic growth e.g., Delhi, Mumbai, Punjab, and Kolkata, etc. In recent decades Bihar labour has also been found to be in demand even in South India as far as Tamilnadu and Kerala.

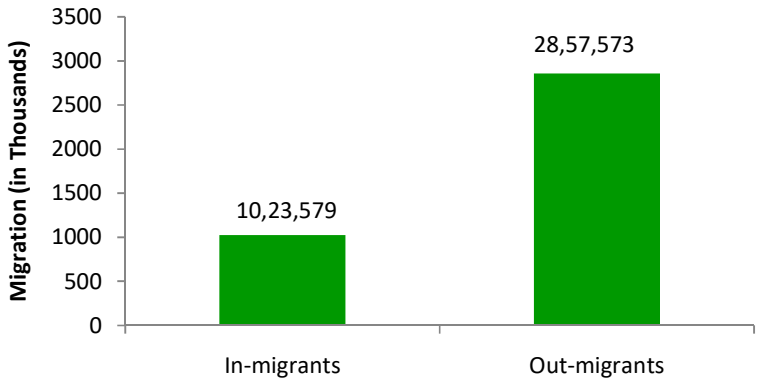


Figure 9: Migration Profile of Bihar for the year 2001

Figure 10 presents percentage share of different migration streams in total rural migration for the year 2001. In the case of male migrants, male migration from rural to urban areas out of total rural migration was 42.64%. In contrast, female rural to urban migration from total rural migration was very low (6.11%). In general while the male migration is attributed to livelihood/ employment opportunities, exclusive female migration is mainly related to marriage.

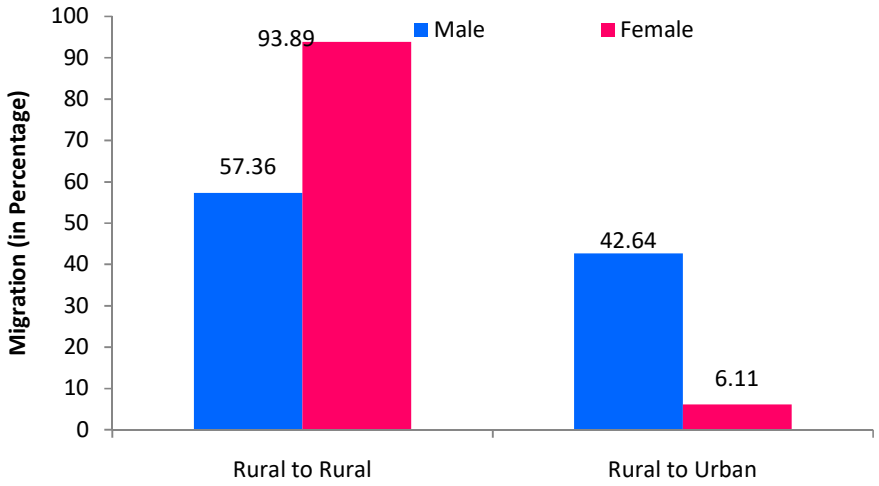


Figure 10: Percentage Share of different Migration Streams in Total Rural Migration for the year 2001

The total urban migration in terms of urban to urban areas was higher than urban to rural areas. Likewise male migration from urban to urban areas was higher than urban to rural areas. Similar pattern is observed in the case of female migration (Figure 11).

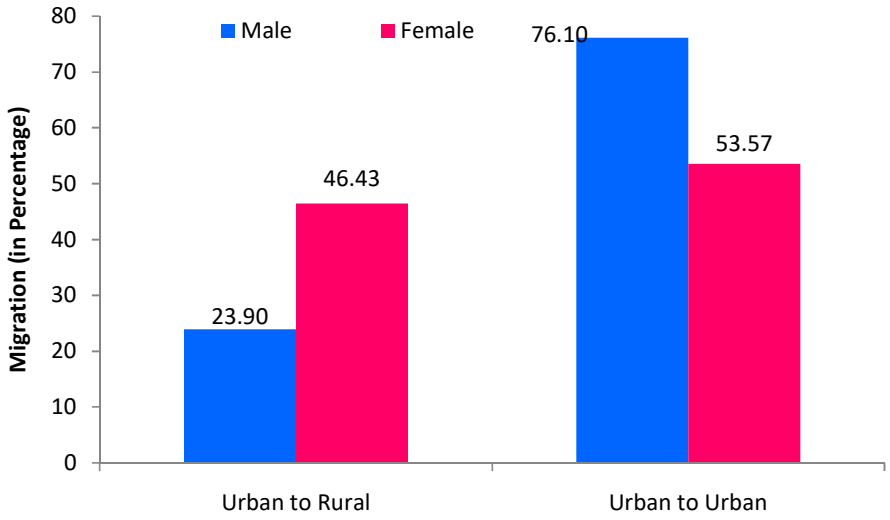


Figure 11: Percentage Share of different Migration Streams in Total Urban Migration for the year 2001

Details of total migrants in the state according to the migration stream is presented in Table 6. The total migration for Bihar in the year 2001 was 1,84,68,036 which is a very large number and represents a significant aspect as regards state demography, socio-economic profile and income.

Table 6: Migration pattern in Bihar for the Year 2001

Migration Stream	Total (In Number)
Total Migrants	1,84,68,036
Total Rural Migrants	1,63,83,192
Rural to Rural	1,59,72,631
Rural to Urban	4,10,561
Total Urban Migrants	20,84,844
Urban to Rural	14,71,701
Urban to Urban	6,13,143

Source: Adapted from Census of India 2001, Government of India

6.1 Regional pattern of Rural-Urban Migration in Bihar

6.1.1 Region-wise and Gender-wise Distribution of Rural and Urban Migration Rates

Rural and urban migration in case of male and female for both bank and non-bank districts are discussed here for the year 2001 (Figure 12). For bank districts, urban male migration (52.67%) was higher than rural male migration (41.82%) and also urban female migration (47.98%) was more than rural female migration (33.15%). On the whole urban migration

was more than rural migration in bank districts. But a different trend is observed in the case of non-bank districts where rural male and female migration rates were higher than the corresponding urban rates.

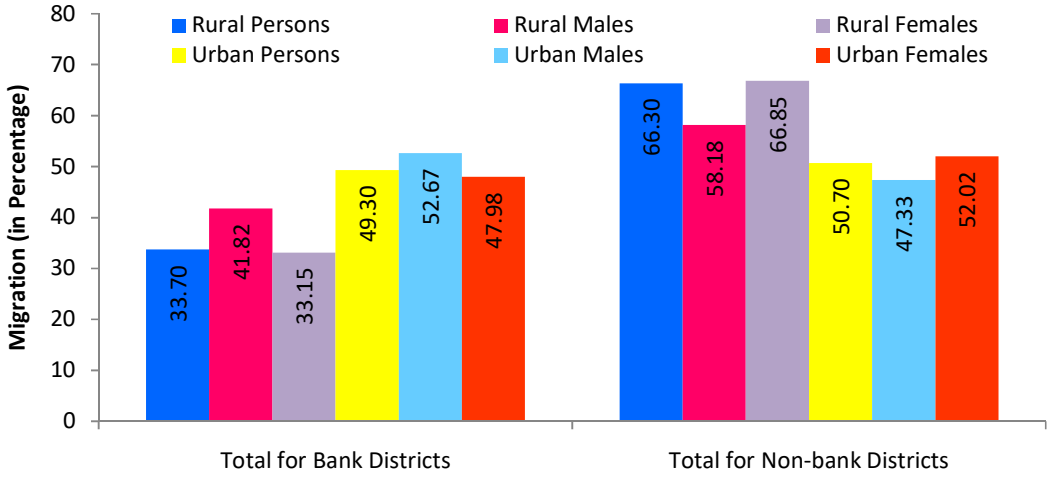


Figure 12: Rural and Urban Migration rates in Bihar for the year 2001 (Last Residence Elsewhere in India)

On the whole it is observed that rural migration was more than urban migration in non-bank districts of Bihar for the year 2001 (refer Annex/Table A8). Moreover, migration in non-bank districts is comparatively higher than that of bank districts of Bihar. Search of work opportunities is the main reason among male population. As Bihar is an agrarian economy, people from rural areas migrate in search of short-term labour work to bank districts.

6.1.2 Region-wise and Gender-wise Rural and Urban Migration rates of Workers

Rural and urban migration of both male and female workers for bank and non-bank districts of Bihar is shown in Figure 13. In bank districts, migration of workers in urban areas (45.21%) was more than that in rural areas (28.49%). Similar pattern is observed for male and female workers of rural and urban areas for bank districts.

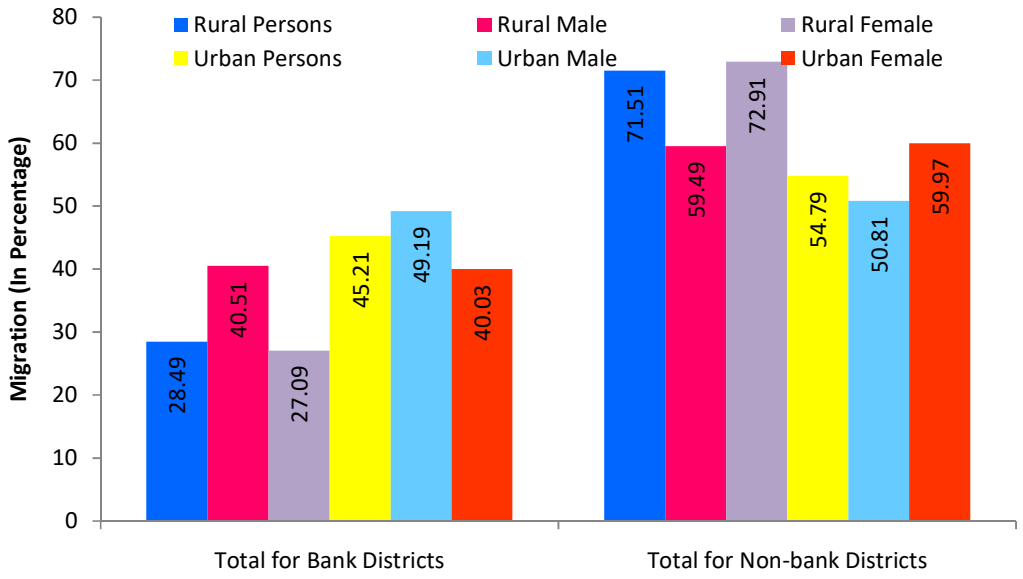


Figure 13: Region-wise Rural and Urban Migration rate of Workers in Bihar for the year 2001 (Last Residence Elsewhere in India)

For non-bank districts, the overall rural workers migration (71.51%) was much higher than the overall urban workers migration (54.79%). It is noticed that while in the case of bank districts rural male migrants are higher than rural female - which is normal; however in the case of non-bank districts a reverse trend is found and which is rather difficult to explain. (Annex/ Table A9). Nevertheless, it can be concluded that rural workers migrate more in non-bank districts in search of work related to primary sector, whereas urban workers migrate more in bank districts in search of work related to secondary and tertiary sector.

6.1.3: Occupational Distribution of Rural-Urban Migrant Workers

Based on the available data for the year 2001 as shown in Figure 14 in all 13 occupational categories have been identified. It is noticed that migration of workers engaged in 'other services' including public services comprises a major proportion at 29%. 'Agricultural labourers' and 'wholesale and retail trade worker' each constitute about 15% of total migrant workers from rural to urban area.

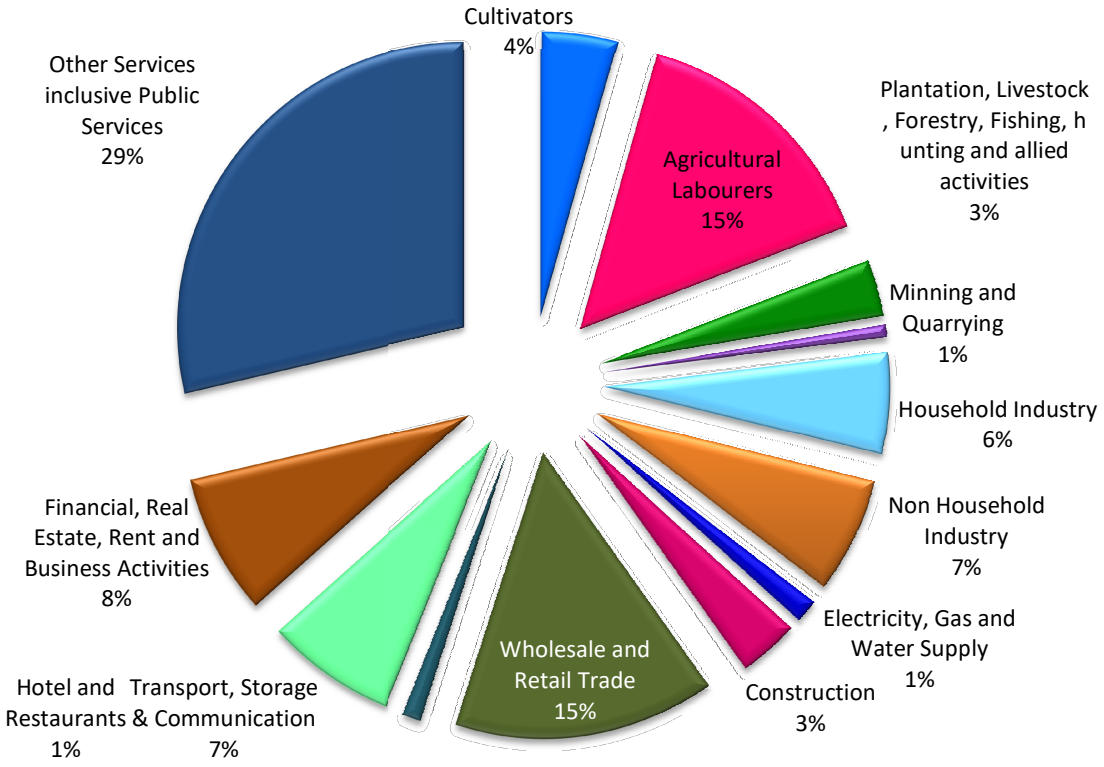


Figure 14: Occupational Classification of Rural to Urban Migrant Workers in Bihar for the year 2001

The percentage share of cultivators, agricultural labourers, mining & quarrying and the household industries workers has occupied one fourth of total migrant workers. 8% of the total migrant workers are engaged in financial, real estate, rent and business activities in Bihar. Very negligible portions (only 1%) of workers are engaged in hotel & restaurants and in electricity-gas and water supply related services (Annex/ Table A10).

7. Condition of Slums

A typical slum is a high density settlement with a collection of poorly built dwellings (with or without tenancy rights), mostly of temporary nature and crowded together. Slums are characterised by significant deficit in terms of infrastructure – especially for water, sanitation, roads, electricity, drainage, etc. Invariably slum population is characterised by low level of education and income and high unemployment; poor health conditions, poor nutrition, etc. As per 2001 census out of the total urban population of about 150 Lakh across the entire state of Bihar close to 25% is residing in slum or slum like settlements. Likewise for the 37 Class-I and Class-II cities in the state (20 and 17 respectively out of a total of 130 cities) where the combined urban population was estimated to be 105.6 lakh the slum population constitutes 25- 31%. Table 7 summarises the data for the state and the country and Figure 15 presents a graphical comparison. It is noted that compared to the national pattern, proportion of slum population across Bihar is higher.

Table 7: Identified Slum Population (in Lakh) in Bihar during 2001

State	Urban Population	Identified Slum Population	Percentage of Slum Population
Bihar	149.556	35.444	23.7
India	2909.437	618.258	21.3
Class-I Towns and Cities			
State	**Urban Population**	**Identified Slum Population**	**Percentage of Slum Population**
Bihar	79.325	24.751	31.2
India	1900.547	424.498	22.3
Class-II Towns and Cities			
State	**Urban Population**	**Identified Slum Population**	**Percentage of Slum Population**
Bihar	26.264	6.566	25.0
India	316.286	63.922	20.2

Source: www.biharstat.com

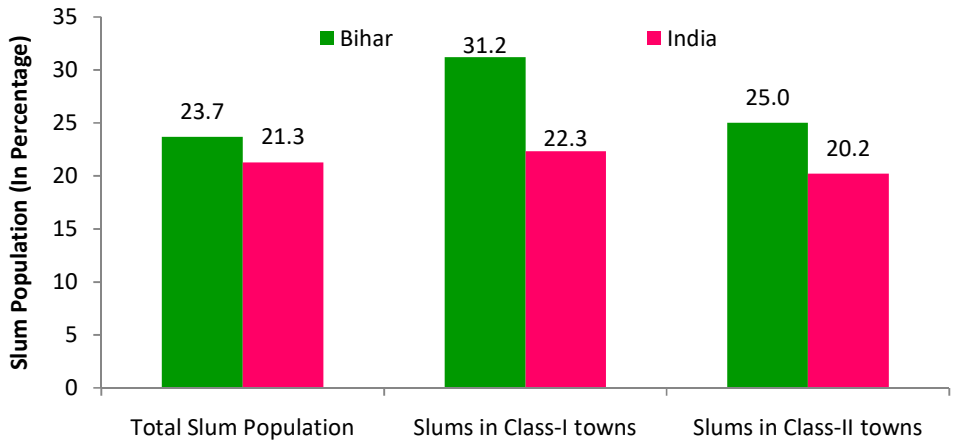


Figure 15: Percentage of Slum Population in Bihar and India for the year 2001

Areas notified as slums by the respective urban local bodies or development authorities are treated as 'notified slums' and the rest of the settlements having at least 20 household are considered as non-notified slums. From Figure 16 it is observed that in 2002 almost three quarters of the poor settlements were not notified as slums. This indicates that a large majority of poor settlements did not receive priority as regards addressing issues of infrastructure, services and livelihood, etc.

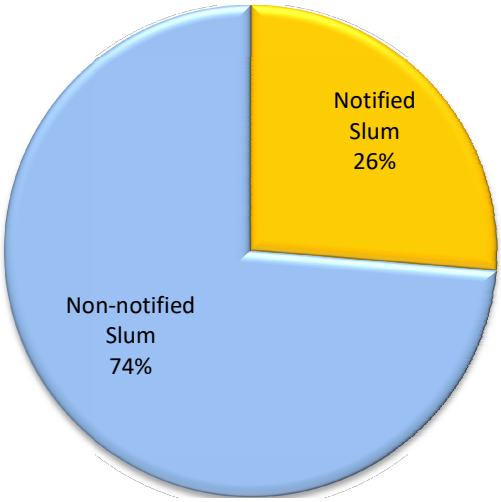


Figure 16: Percentage of Notified and Non-notified Slums in Bihar for the year 2002

Type of dwellings

House structures have been classified into three categories viz., pucca, semi-pucca and katcha houses. In notified slum areas about 66% houses are classified as semi-pucca. However in the case of non-notified slum areas semi-pucca dwellings constitute only 12% while the balance 88% comprise katcha houses (Figure 17 and Annex/Table A11).

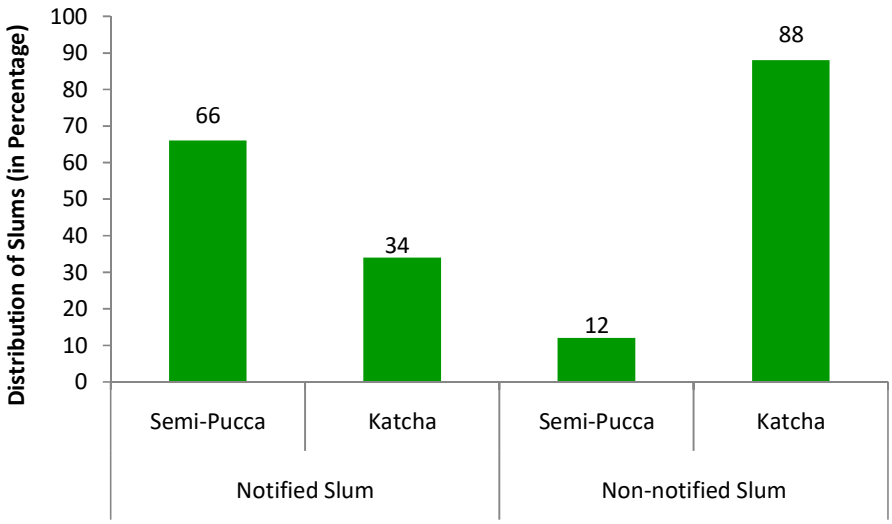


Figure 17: Percentage Distribution of Slums according to Structure of Majority of Houses in Bihar for the year 2002

Utilities and services

As per the information provided in Annex/Table A12 attached to this report, it is noted that entire population of all communities of notified and non-notified slum areas across the state does not have piped water supply and instead depends on tube wells (mostly shallow

and unprotected tube wells) for drinking water supply. This puts all the communities to the risk of water borne diseases and consequent socio-economic impacts.

As regards availability of electricity in notified slum areas it is found that almost 66% of households have individual connections whereas in the case of non-notified slum areas this drops down to 37% (Figure 18 and Annex/ Table A12).

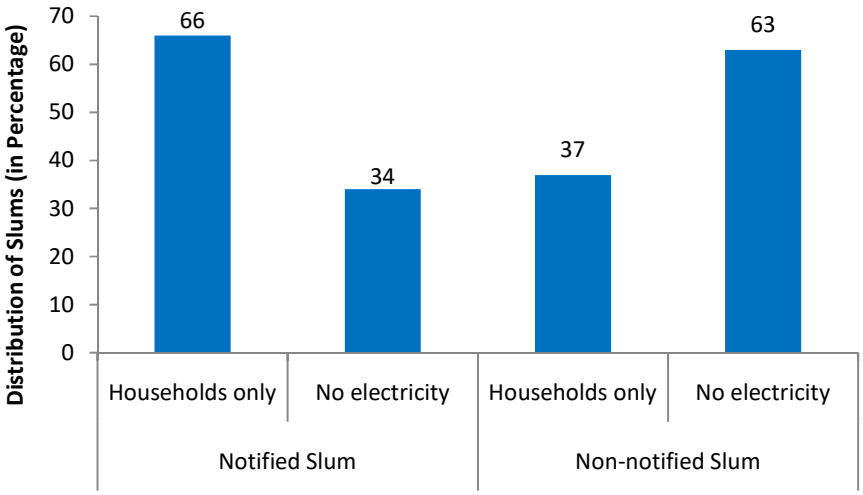


Figure 18: Percentage Distribution of Slums according to Availability of Electricity connections in Bihar for the year 2002

8. Level of industrialisation in Bihar

Bihar has a very small industrial base compared to the other Indian states of the country. Besides cumulative deficit in investments, this is also attributed to bifurcation of the state in year 2000 when industrialized belt has gone to the state of Jharkhand. While the state accounts for about 3% of the total land mass and 8.5% of the total population of the country, low level of industrialization is evident by presence of only 1% of the total factories and contribution of less than 1% towards the national industrial output. While on the national level contribution of the industrial sector is about 20%, in the case of Bihar it is as low as 5%. State industrial sector is dominated by small household and cottage industries. With over 80% of the state population employed or engaged in agriculture or related activities agro-based small and medium scale industries occupy a prominent place in the industrial landscape of present Bihar as they account for nearly half of the net value added (Report on "Road map for Rural Industrialization in Bihar", Govt. of India, 2008).

While Bihar is a major producer of several types of fruits and vegetables, it is characterized by almost complete lack of processing industries. The state also does not have commensurate infrastructure for irrigation, storage, transport of its produce, etc. Historically, sugar and vegetable oil extraction industries were flourishing sectors and until the mid-1950s, the state used of account for almost 25% of total sugar output in the

country. Given this scenario Dalmianagar was recognized as a large agro-industrial town in the industrial landscape of the state. In the subsequent period between 1950 and 1980 there were attempts to industrialise the state (e.g., oil refinery in Barauni, a motor scooter plant at Fatuha, a power plant at Muzaffarpur, etc.) however, for a variety of local and external factors they did not bear fruit. Nevertheless, Barauni is still one of the few old industrialised towns in the state.

Overall low level of industrialization and investment deficit is reflected in high debt of the state which was estimated at 77% of GDP by 2007. In recent years high priority has been accorded to industrialization by inviting investments from large industrial houses. A set of breweries are also proposed to be set up in the near future and further developments have taken place in the growth of small industries.

8.1 Growth Trends in NSDP from Manufacturing and Tertiary Sector

The annual growth trends in NSDP from manufacturing and tertiary sector and the state income (GSDP) from 2005-06 to 2008-09 is discussed here. From the Figure 19 it is noted that in 2005-06 the growth rate in state's manufacturing sector was negative at (-)10.9%, however subsequently in 2007-08 it increased significantly to 31.7%, but again it has declined to 20.7% in 2008-09. Even tertiary sector has exhibited a fluctuating trend over the years and was recorded to be 15.8% in 2008-09.

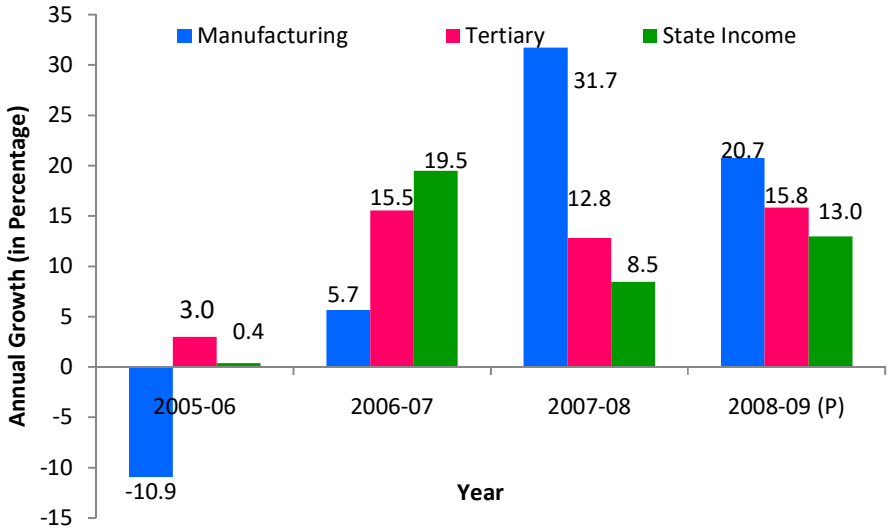


Figure 19: Annual Growth rate (NSDP) and State Income of Bihar

In 2005-06 the growth rate of Gross State Domestic Product (GSDP) (or State Income) was recorded as low as 0.4%, however subsequently in 2008-09 this has increased to an impressive 13.0%. It is a noteworthy that over the years contribution towards the annual

growth rate of GSDP was more from the tertiary sector rather than the manufacturing sector.

8.2 Trends in Number of Industries, Fixed Capital (FC), Employment, Output and NVA of Bihar

Table 8 summarises data for the state and the country on number of industries/ factories, fixed capital, number of workers, etc. and related ratios for the years 2001-02 and 2010-11. The last column in the table presents growth in Bihar over the 10 year period.

As stated earlier Bihar accounts for around 1% of the total factories in the country which is way too low in relation to its population base. Fixed capital, gross output and 'net value added' are found to be 0.4%, 0.8% and 0.4% respectively which are significantly low. Further, in relation to the population fraction of 8% the number of workers and number of employees between 0.8-0.9% also indicate significantly low investments and low opportunities for employment. However as seen in the last column, in relation to the decadal population growth of 25% there has been a reasonably good growth on parameters.

Table 8: Trends in Capital, Employment, Output and NVA in Industries (Factory Sector) in Bihar and India

Year	2001-02			2010-11			Decennial
	Bihar	India	%	Bihar	India	%	growth, %
Population (Crore)	8.30	102.8	8.1	10.41	1210	8.6	25
No. of factories	1,478	128,549	1.1	2,805	211,660	1.3	90
Fixed Capital (FC) (in Rs. Crore)	188,919	43,196,013	0.4	526,212	160,700,652	0.3	179
No. of workers	51,375	5,957,848	0.9	90,985	9,901,970	0.9	77
No. of employees	62,618	7,750,366	0.8	106,213	12,694,853	0.8	70
Gross output (Rs. Crore)	671,339	96,245,663	0.7	3,605,131	467,621,696	0.8	437
Net Value Added (NVA) (Rs. Crore)	62,994	14,430,212	0.4	441,499	70,457,581	0.6	601
No. of workers/ factory	34.76	46.35		32.44	46.78		-7
FC/Workers (Rs. Lakh)	3.68	7.25		5.78	16.23		57
NVA/FC	0.33	0.33		0.84	0.44		155
NVA/Worker (Rs. Lakh)	1.23	2.42		4.85	7.12		294

Source: Compiled from Annual Survey of Industries 2001-02 and 2010-11, Govt. of India

It is also noted that while the ratios of 'fixed capital to number of workers', 'NVA to fixed capital' and 'NVA per worker' have recorded decennial growth varying from 57% to around

300%, there has been a decline in the ratio of 'no. of worker per factory', the latter indicating creation of less number of jobs.

9. Sources of Pollution in the River Ganga

Although Bihar has witnessed significantly lower levels of urbanisation and industrialisation, there are issues related to weak municipal infrastructure and services as well as inadequate implementation of regulatory measures and monitoring which contribute towards aggregation of pollution of the river system. With increasing urban population and urban centres, in general discharge of sewage from a large number of small, medium and large size urban centres across the state represents one of the major sources of water pollution. Other sources comprise discharge of trade/ industrial waste waters, leachates from open dump sites of municipal and industrial solid wastes, runoff from agriculture fields laden with pesticides and fertilizers, poorer drainage system, etc. Broadly these sources can be classified as point and non-point sources. Point sources include discharge of domestic sewage and industrial effluent; while non-point sources comprise runoff from agricultural fields, storm water drainage, etc. This section primarily deals with point sources of pollution.

9.1 Urban Sewage

In Bihar, only 12 districts are coming near River Ganga, but most of the non-bank districts are situated near the tributaries of Ganga River. Among these districts there are 199 towns and cities out of which there are 27 relatively larger towns and cities which have population in excess of 1 lakh. Among these 27 cities, one city i.e., Patana has population in excess of 20 lakh while all others fall below 5 lakh. Among the latter group, 5 cities are in the range of 3-5 lakh, 6 are in the range of 1-2 lakh and around 15 are in the range of 1-2 lakh. Rest of the 172 towns have population in the range of 5000 to 1 lakh. Total sewage generation from all the 199 towns and cities is estimated to be of the order of 1320 million litres per day (mld). (In a majority of the towns generation is estimated to be in the range of 0.5 to 10 mld while for the 27 leading towns and cities it is estimated to be from 12-64 mld and for Patna 265 mld). Evidently all of these small and large urban centres alike are generating significant quantities of sewage which is discharged into.

However as shown in Table 9 below, out of the 27 'one lakh plus' cities only 5 have some form of system in place for sewage treatment while the rest of the towns and cities are discharging untreated sewage into the river system of Ganga either directly or through one of its tributaries. It is also noted that even in these cities the aggregate installed treatment capacity is way below the current requirements, let alone the projected loads 5 or 10 years down the line. Besides the aggregate installed capacity of 167 mld it is understood that for the 4 towns/cities of Patna, Chapra, Munger and Bhagalpur 7 STPs were sanctioned with a total capacity of 87.5 mld (MLD) by the Ganga Project Directorate. However it is evident that in relation to the total estimated sewage volume of around 1320 mld, this is miniscule or almost insignificant. Figure 20, 21 and 22 bring out the current scenario across the state

as regards the mode of disposal and level of treatment, etc. while further details are presented in Appendix/Table A13.

Table 9: Waste Water Generation and Treatment in Bihar (Disposal in Ganga River)

City/Town	Population	Total Sewage (in MLD)	Treatment Capacity (in MLD)	Percentage Covered
Class-I				
Bhagalpur	3,81,190	61.6	11	17.9
Patna	15,42,184	249.2	109	45.0
Munger	2,09,790	34	13.5	39.7
Katihar	1,96,190	31.7	31.7	100
Class-II				
Buxar	82,975	7.6	2	26.3

Source: Central Pollution control board (2009-10), Ministry of Environment and Forests, Government of India

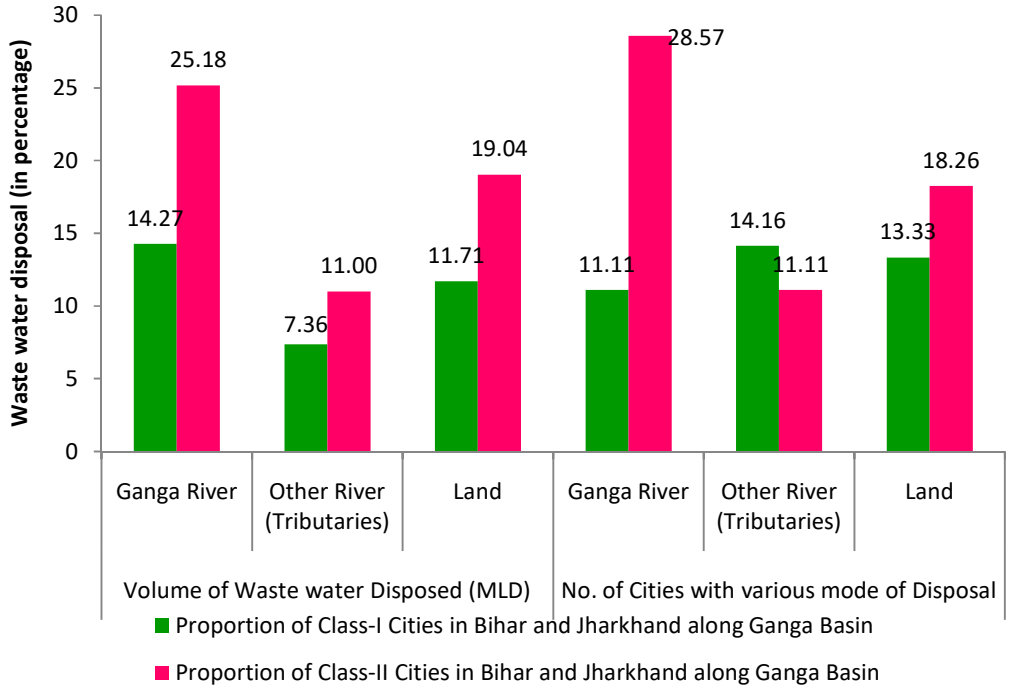


Figure 20: Percentage of Municipal Wastewater Disposal and Mode of Disposal in Ganga Basin (Bihar and Jharkhand) for the year 2010

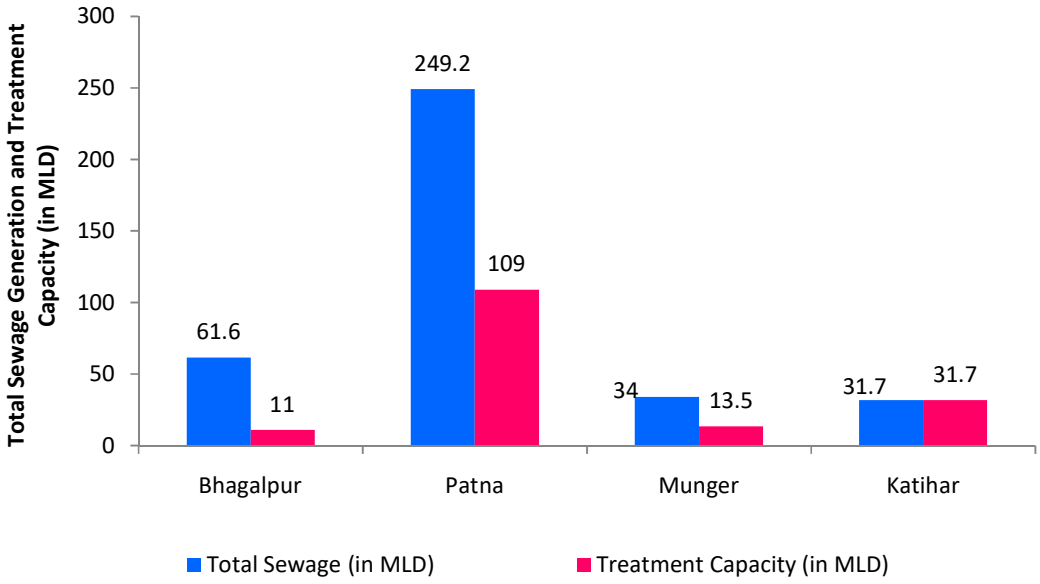


Figure 21: Wastewater Generation and Treatment Capacity for Class-I Cities Discharging Wastewater into the Ganga River

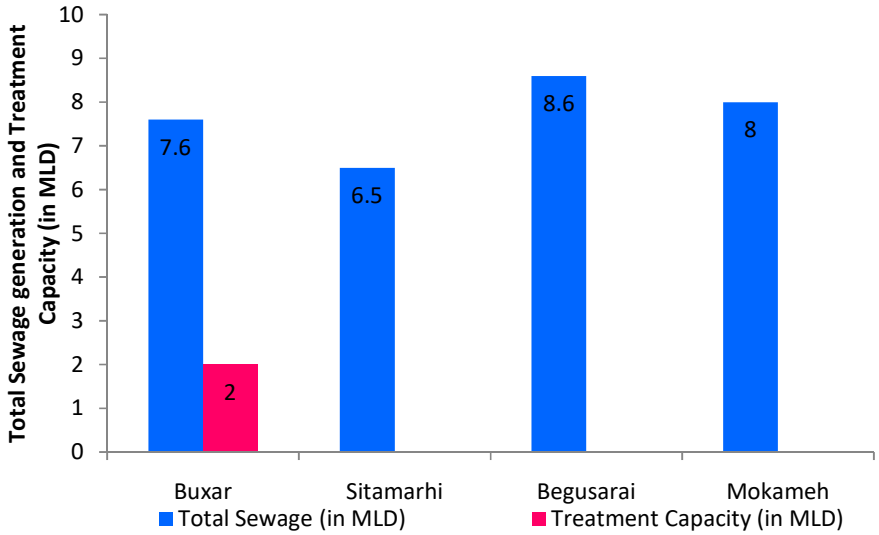


Figure 22: Wastewater Generation and Treatment Capacity for Class -II Cities Discharging Water into the Ganga River

9.2 Industrial Effluents

With a weak industrial base across the state, prima facie water pollution from industrial sources may not be as critical an issue as in the case of other states in the Ganga basin, e.g., UP and West Bengal. For instance as per the state pollution control board, there are only 34 industrial estates across the state where the registered of industries is only 5092. However,

given the dominance of industries in the areas of sugar, distillery, dairy, tanneries, fertilizer, etc., and given the generally weak regulatory system, industrial pollution is of concern in selected pockets. As shown in Table 10, in general sugar and distillery industries are contributing a large portion of industrial effluents to the River Ganga. Begusarai with presence of an oil refinery, a thermal power plant and a chemical fertiliser plant is a significant place on the industrial map of Bihar and is of special relevance from the point of view of industrial of pollution.

Table 10: Pockets of Industrial Pollution Across Bihar

District	Type of Industries
Begusarai	Refinery, Fertilizer, Thermal
Patna	Dairy, Tannery, Distillery
Bhagalpur	Distillery, Thermal
Gopalganj	Distillery, Sugar
West Champaran	Distillery, Sugar
Sitamarhi	Distillery, Sugar
East Champaran	Sugar
Muzaffarpur	Thermal

Source: Bihar State Pollution Control Board Patna, Government of Bihar 2009-10

As regards industrial hazardous waste, the SPCB data show only 41 generators units distributed in 12 districts and the combined waste load is estimated to be about 3439 MT per annum. Out of the 12 districts there are 7 'bank districts' which together account for almost 99.5% of the hazardous waste in the state. However as seen from Table 11, among the 7, bulk of the hazardous waste is generated in only two districts of Begusarai and Patana while in the rest the quantities are insignificant. On the whole, total hazardous waste generation in Bihar is estimated be only about 0.06% of that in the country. Notwithstanding the relatively lower quantities, it is noteworthy that there are no designated or authorised facilities or sites for 'treatment, storage and disposal' of this category of waste in the state and neither are there any incinerators. Lack of commensurate infrastructure is evidently a cause of concern, particularly when the waste is characterised as hazardous.

Table 11: Pockets of Industrial Hazardous Waste Generation Across Bihar, 2009

Sr. Nr.	District	Land Disposable Waste	Incinerable Waste	Recyclable Waste	Total Waste
A.	Bank				
1	Begusarai	2790	8	-	2798
2	Munger	-	2	5	7
3	Bhagalpur	-	21	-	21
4	Patna	556	33	-	589
5	Katihar	-	2	-	2
6	Vaishali	1	0	-	1

Sr. Nr.	District	Land Disposable Waste	Incinerable Waste	Recyclable Waste	Total Waste
	Sub-Total	**3347**	**66**	**5**	**3418**
B.	Non-Bank				
7	Muzaffarpur	10	6	0	16
8	Samastipur	0	1	0	1
9	Rohtas				
10	Aurangabad				
11	West-Champaran			2	2
12	Gopalganj			2	2
	Sub-Total	**10**	**7**	**4**	**21**
	Grand-Total	**3357**	**73**	**9**	**3439**

Source: National Inventory of Hazardous Waste Generating Industries, CPCB, Feb. 2009.

10. Conclusion and Policy Implications

Although it is not the mandate of this study, however a set of broad conclusions that are evident from the foregone analysis and discussions and a set of policy implications are presented hereunder.

10.1 Urbanization

- With only around 12% of the state population residing in urban areas, Bihar is recognised as one of the least urbanised and least developed states in the country.

- Relatively significant urbanisation is reported only in 4 of the 12 'bank districts'. As a result the hypotheses that proximity to the River Ganga is the key factor for economic growth does not seem to emerge clearly in this case. Not questioning the universality of this premise, it indicates significant cumulative investment deficit towards development works across the state in general and industrialisation in particular.

- During 2001-2011 the aggregate urban population across the state has recorded a decennial growth of 35%. The number of urban centres has jumped by over 50%, bulk of which is accounted by towns under 10,000 population. However, the state government does not appear to be prepared to handle urbanisation of smaller towns and has not recognised them as statutory towns. As a result, these emerging urban centres are do not have appropriate institutional support system (competent urban local bodies) for planned growth and infrastructure development.

- On the whole about a quarter of the urban population is found to reside in slums or slum like settlements.

- In general urban areas in Bihar are characterised by poor municipal infrastructure. For instance dependency on hand pumps as source of drinking water across the state (comprising both urban and rural) has increased from 78% in 2001 to 88% in 2011.

- Likewise there is significant deficit of wastewater/sewage collection and treatment systems. For instance out of the 199 urban centres (27 major cities/towns) only 5 have sewage treatment plant and where the aggregate installed capacity is around 50% of the current requirements. On the whole the installed treatment capacity vis-a-vis the total sewage generation is deemed to be insignificant.

- Similarly there are no facilities for treatment and safe disposal of municipal solid waste which is leading to, among others, discharge of leachate into the water bodies, blockages of drainage channels and air pollution.

- General infrastructure deficit is known to be affecting public health, the quality of life and adversely impacting the receiving environment/ water bodies.

- State demography is also uniquely characterised by large out migration to other parts of the country, particularly in search of employment and livelihood. Relatively larger fraction of migrants comprise from rural areas which pertains to unskilled labour force, agriculture workers, etc.

- Large scale out migration represents significant deficit in employment opportunities and thereby weak industrial base in the state. However, remittances from the migrant workers are perhaps also the main source of income for a fairly large section of the rural population

10.2 Industrialisation

- Despite the advantage of early investments in some large-scale industries and base for sugar and distilleries, Bihar has lagged behind in attracting investments for industrial growth. The number of factories constitute under 1.5% of the national and there are virtually no industries or industrial belts of national significance.

- During the last decade the state has recorded impressive growth in GDP and it is expected to be sustained under the current political setup, however it faces severe challenges in terms of capital, human resources, enabling framework, supporting infrastructure, etc.

- Prima facie aggregate pollution from industrial sources is low as compared to the urban sector or other parts of the country. Nevertheless, lack of infrastructure for treatment of effluent and hazardous waste, among others, is found to be a major issue which is adversely affecting receiving water bodies and the environment.

- The state has been characterised by significant deficit in governance which is also contributing to lack of planning for the necessary infrastructure development. As regards pollution control this deficit is reflected in terms of weak implementation of the existing legal provisions and poor monitoring.

10.3 Policy Implications

- As regards development, it is evident that the state requires significant all out support and inflow of resources so as to exploit available potential.

- There is major need to promote non-farm employment opportunities in rural Bihar so that on one hand pace of migration to urban areas can be controlled and on the other hand the economic well being of the rural people in Bihar can be improved.

- There is an urgent need for growth of supporting infrastructure for the agriculture and horticulture sectors thereby facilitate exports from the state and increase income of its people.

- There is a need to recognise the emerging smaller Census Towns as ULBs which are hitherto classified as Village Panchayats and provide enabling institutional support system.

- There is an urgent need to strengthen infrastructure and services for, among others, sewage, drainage and solid waste management in all urban centres across the state.

- There is a need to adopt a paradigm shift towards urban sanitation and solid waste management so as to consider appropriate approaches and technologies.

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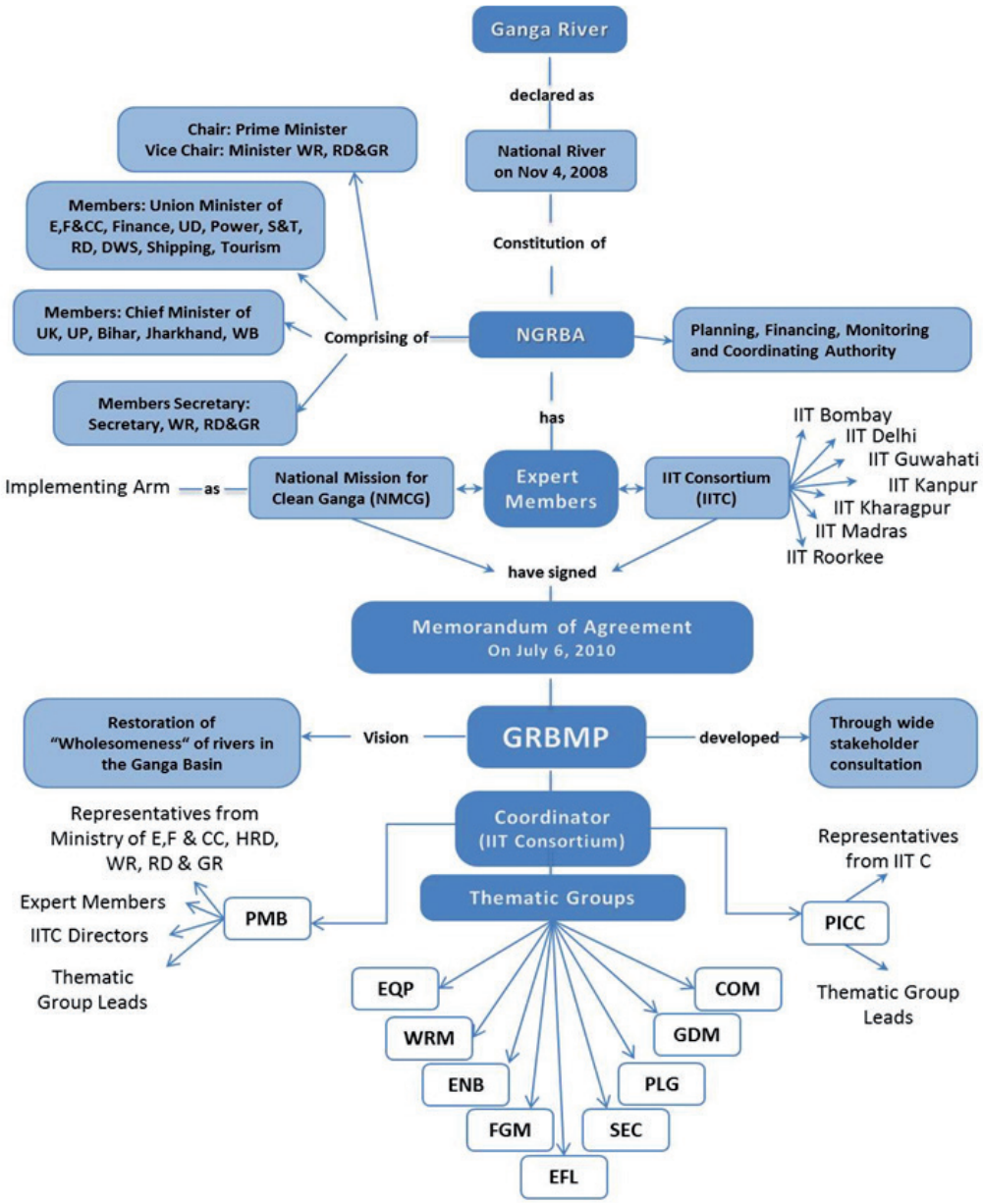
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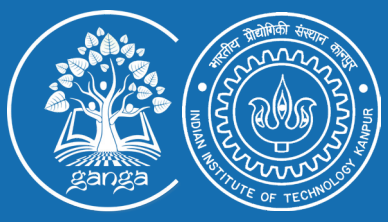
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NMCG: National Mission for Clean Ganga
MoEF: Ministry of Environment and Forests
MHRD: Ministry of Human Resource and Development
MoWR, RD&GR: Ministry of Water Resources, River Development and Ganga Rejuvenation
GRBMP: Ganga River Basin Management Plan
IITC: IIT Consortium
PMB: Project Management Board
PICC: Project Implementation and Coordination Committee

EQP: Environmental Quality and Pollution
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