

Demographic and Socio-Economic Analysis

of the Upper Ganga Basin

GRBMP : Ganga River Basin Management Plan

by

Indian Institutes of Technology



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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

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 km² 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 km² 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 percent¹.

As per the 2011 census, average population density in the state is 189 persons per km², 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 15,761 inhabited villages². 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% and 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

Figure 1 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.

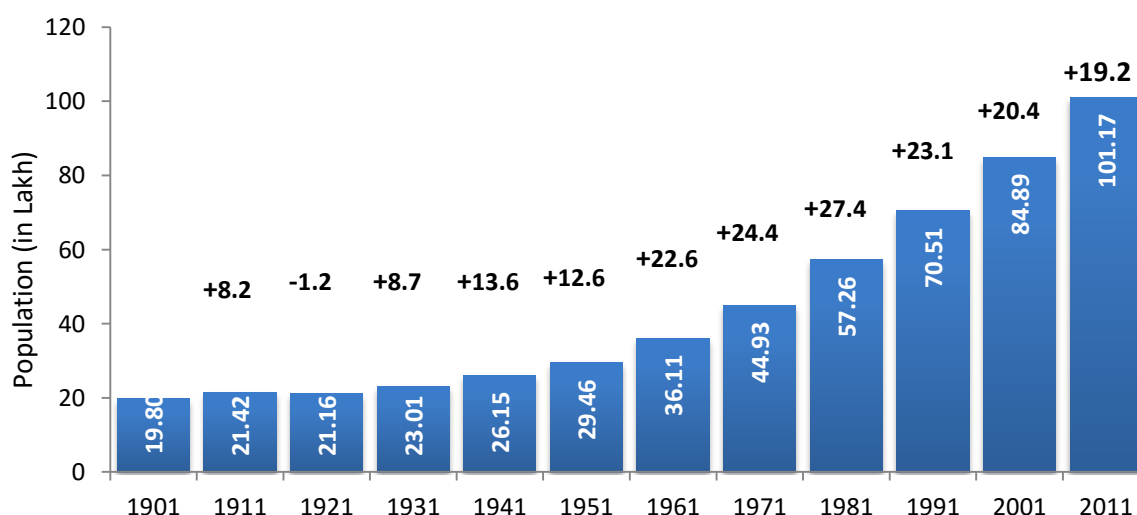


Figure 1: Trends in Population and Population Growth Rate (%), in Uttarakhand, 1901-2011

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 Udham Singh 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., Udham Singh 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.

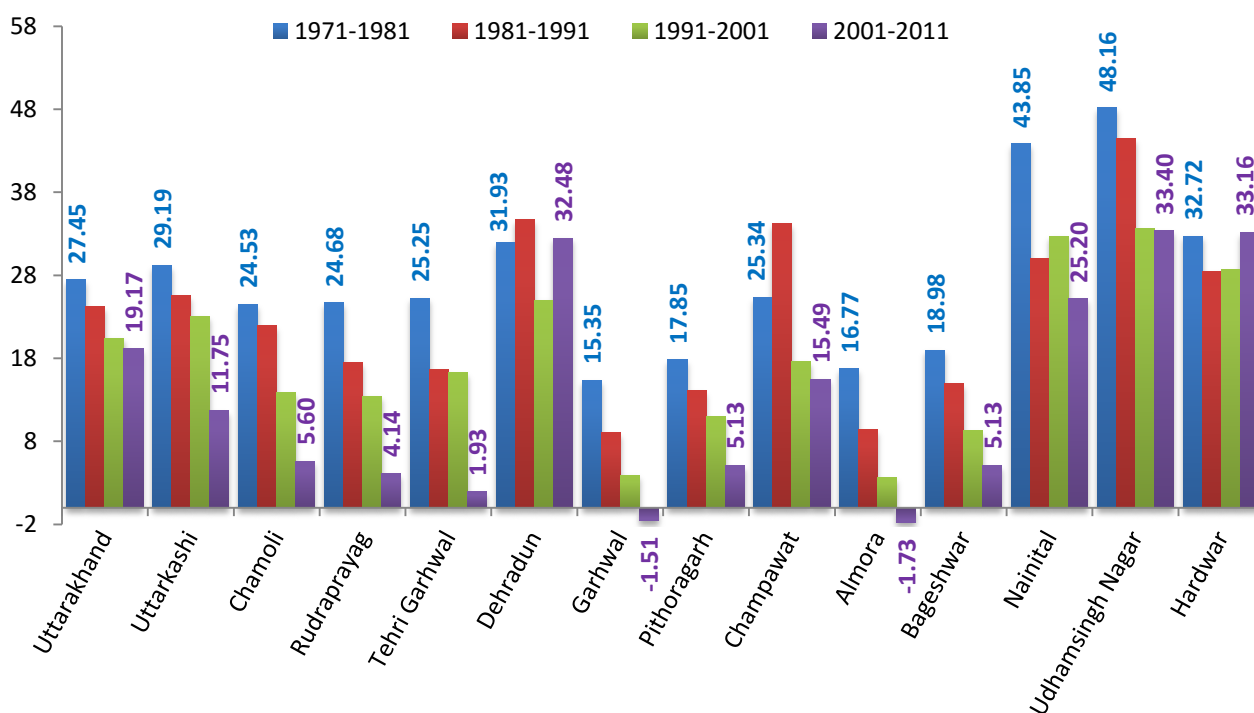
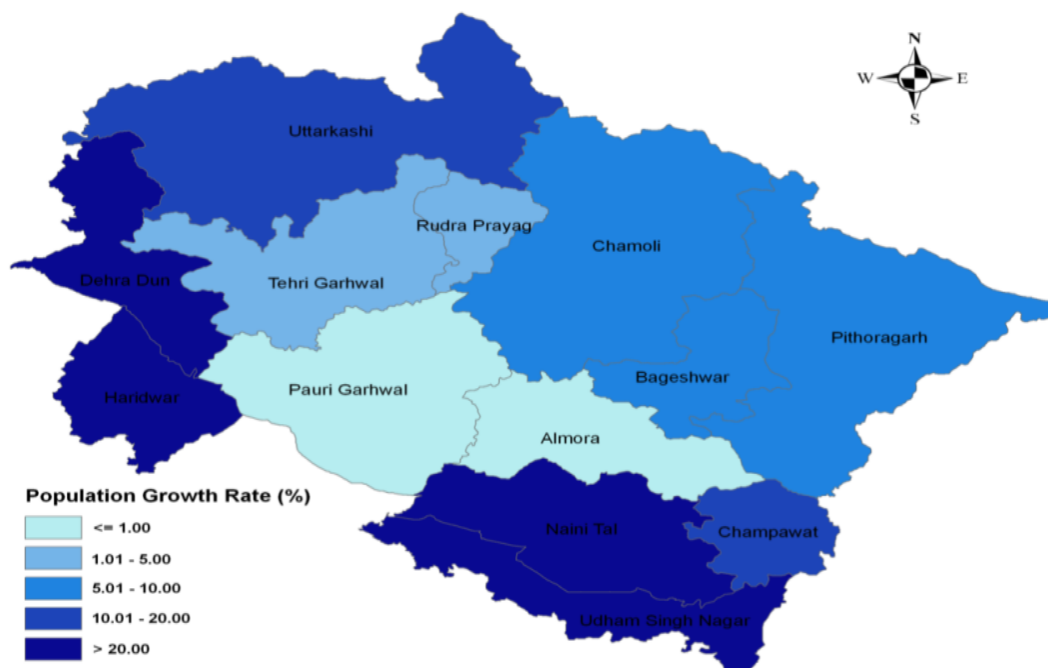


Figure 2: Trends of Decennial Population Growth Rate (%) in Uttarakhand, 1971-81 to 2001-11



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.

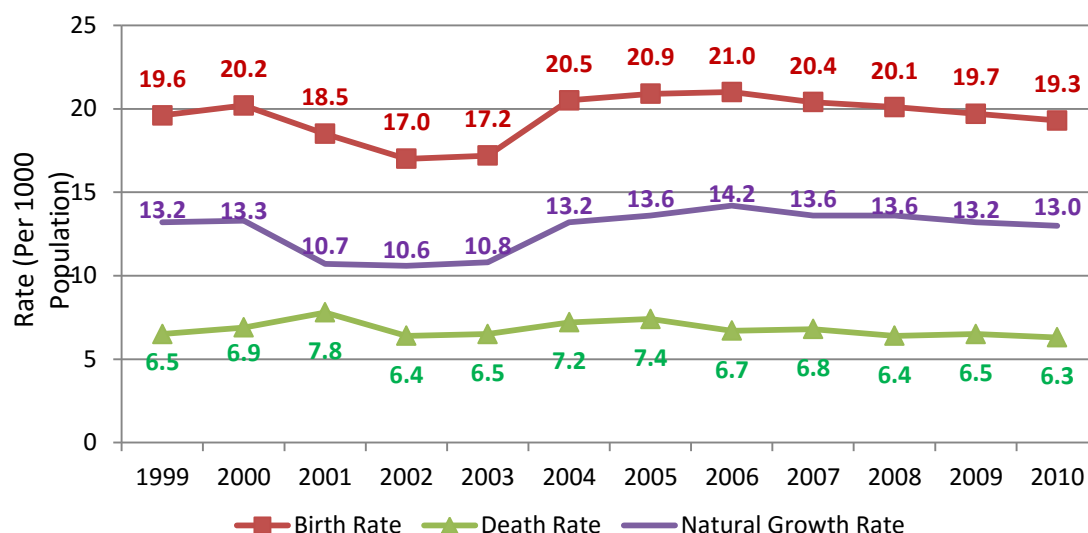


Figure 3: Birth, Death, and Natural Growth Rate (per 1000 population), Uttarakhand, 1999-2010

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.

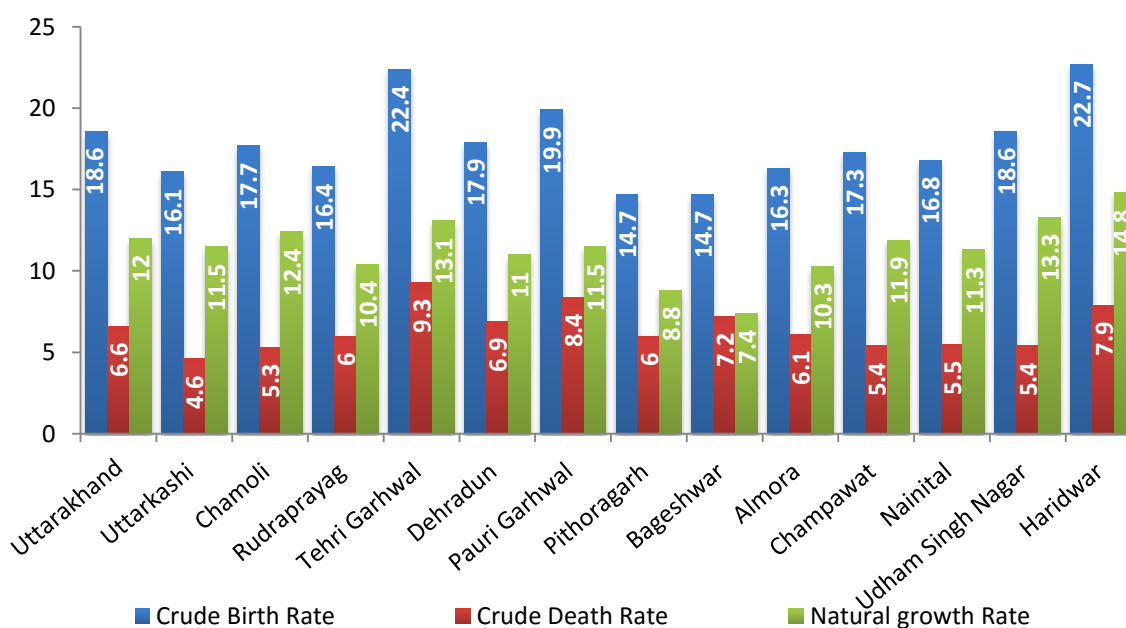


Figure 4: Birth, Death, and Natural Growth Rate (per 1000 population) across districts of Uttarakhand, 2010-11

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		
	T	R	U	Total			Rural			Urban			T	R	U
				T	M	F	T	M	F	T	M	F			
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.

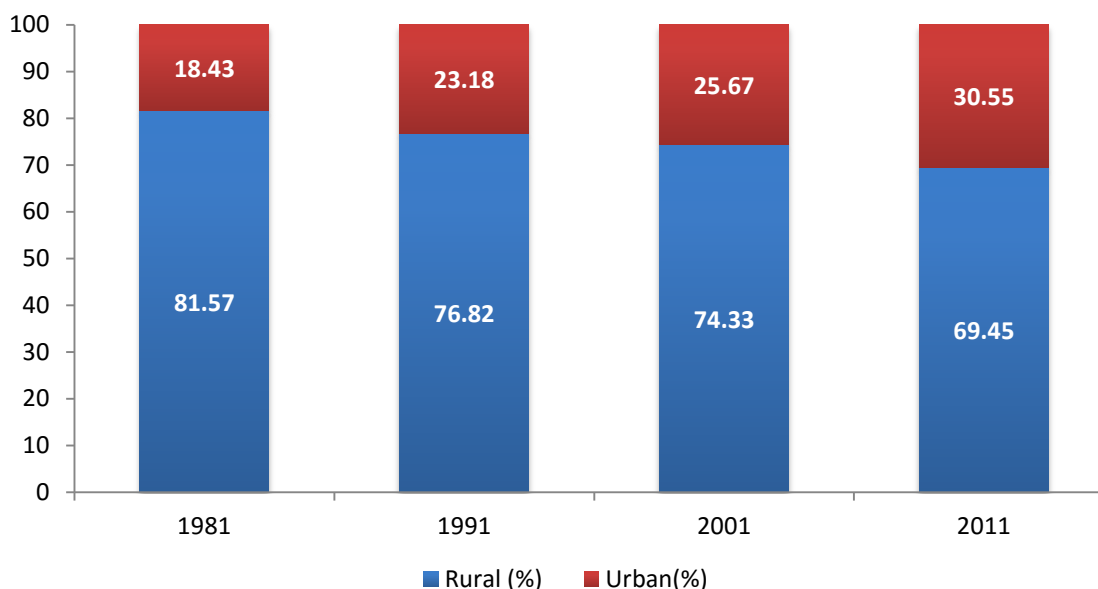


Figure 5: Distribution of population by Place of Residence, 1981-2011 Uttarakhand

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%).

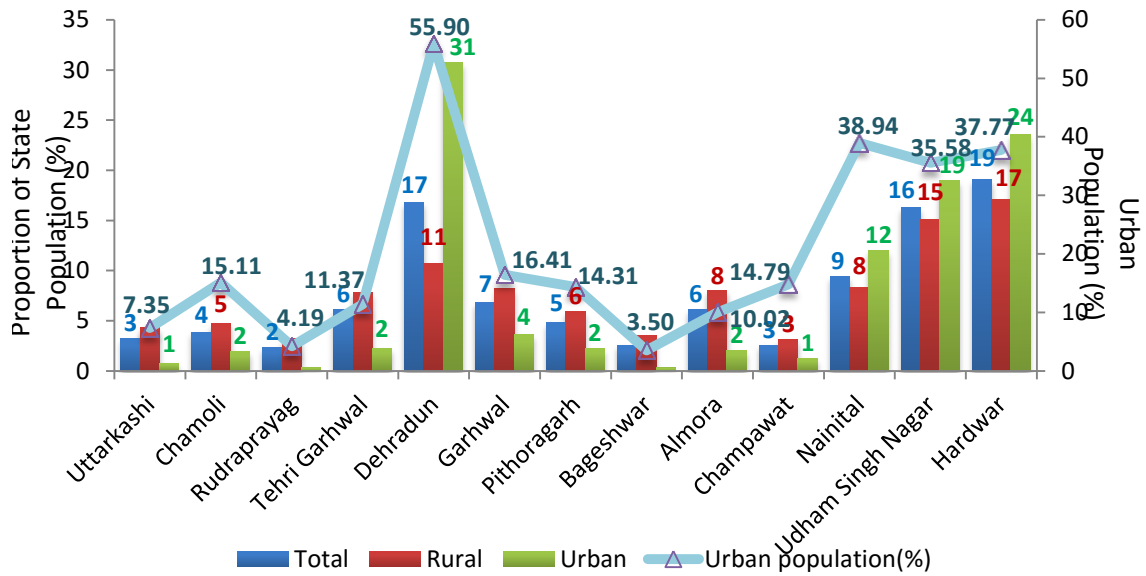


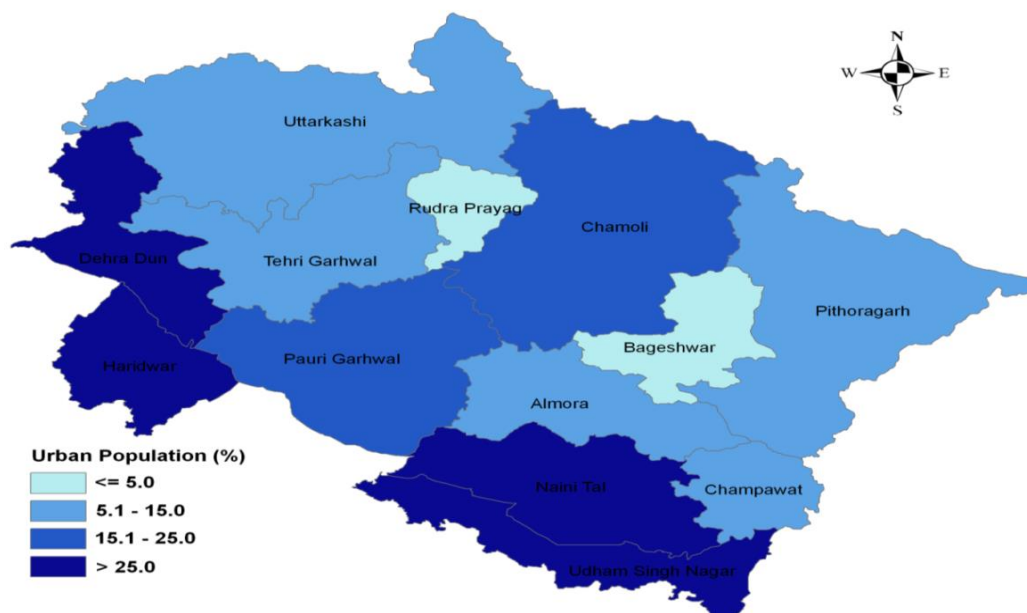
Figure 6: District-wise percentage share in the total State Population and level of Urbanization in 2011

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.

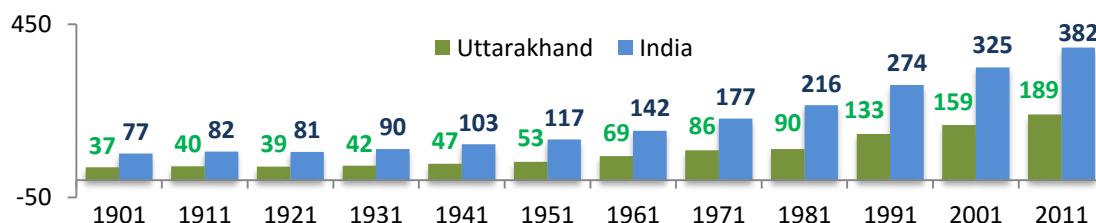


Figure 7: Population Density (Per Sq. Km) in Uttarakhand and India, 1901-2011

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

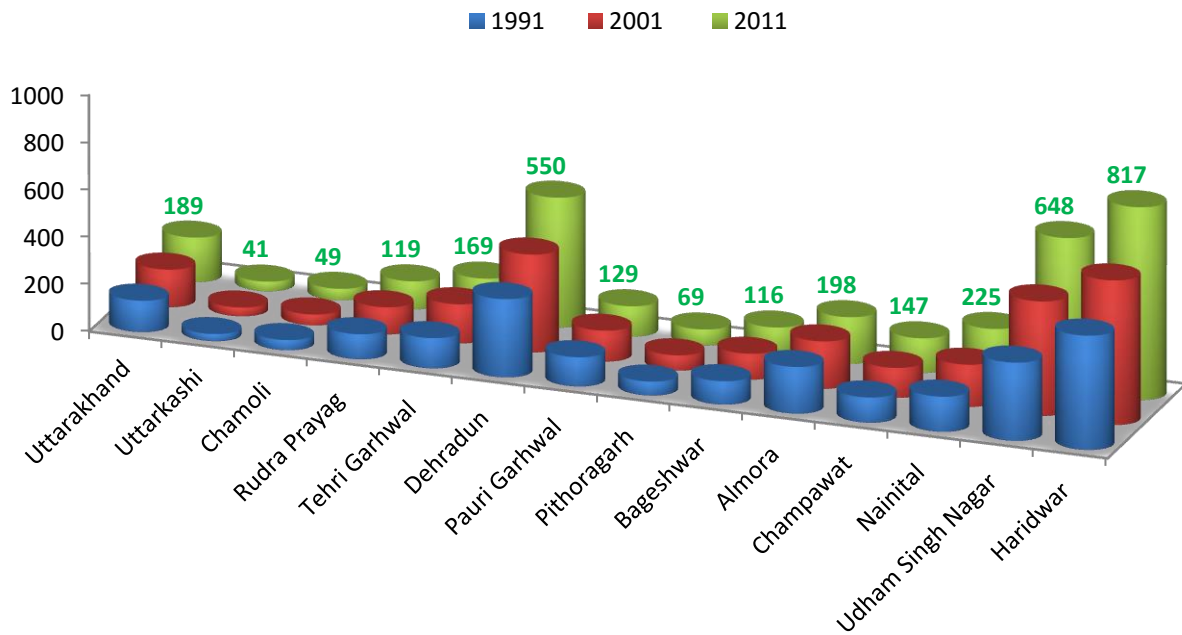
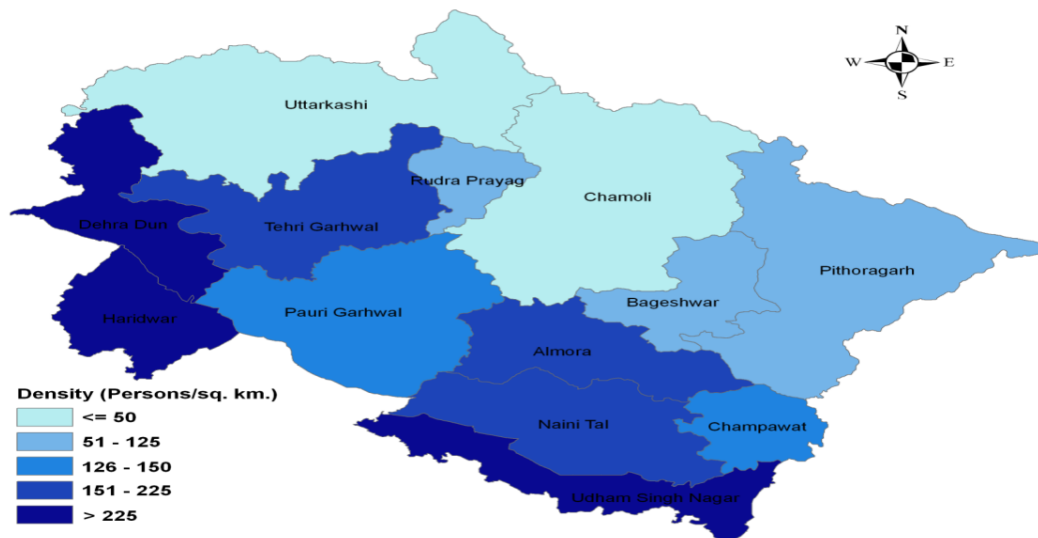


Figure 8: Population Density (Persons/sq.km.) across Districts of Uttarakhand, 1991-2011



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..

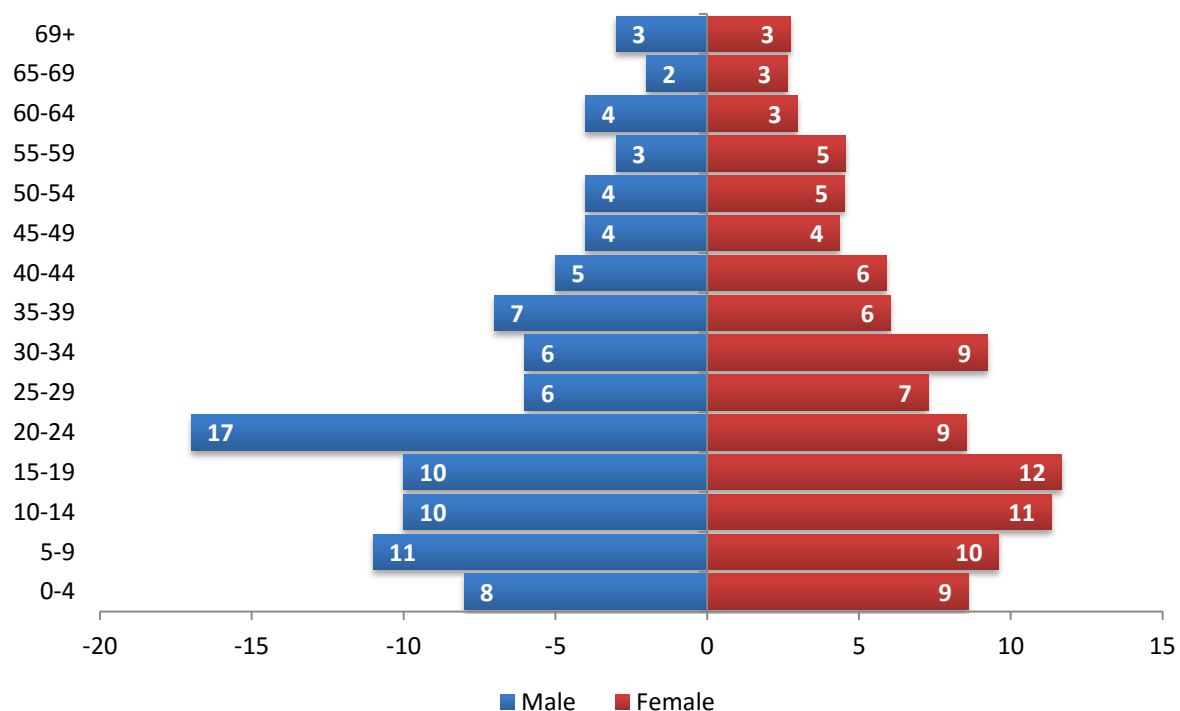


Figure 9: Age-Sex Population Pyramid, Uttarakhand, 2009-10

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.

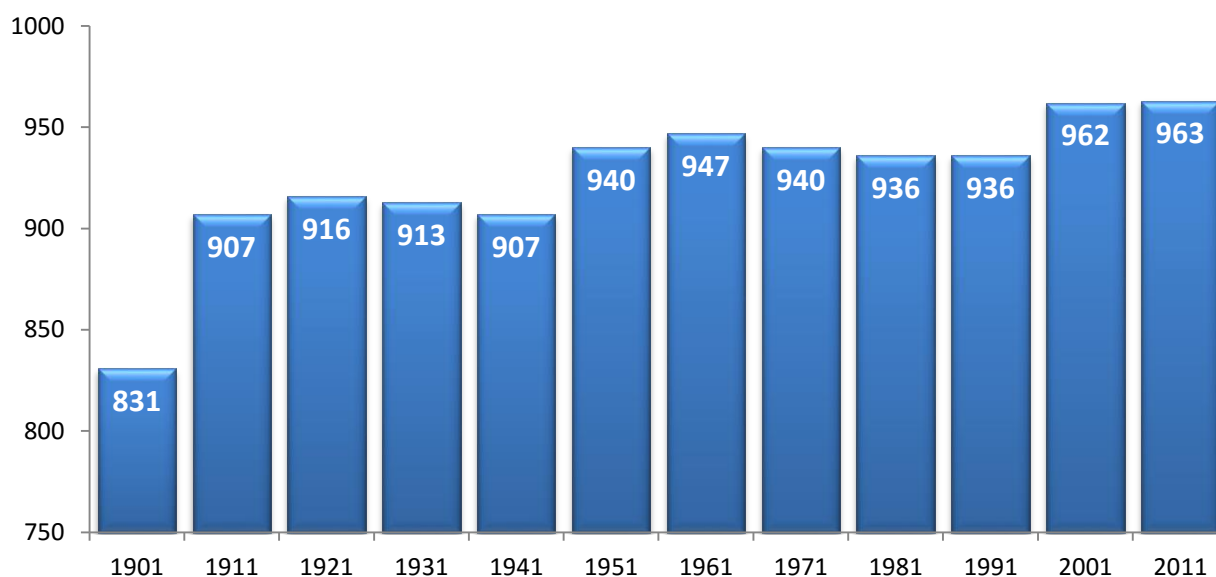


Figure 10: Trends in Sex Ratio (Female/1000 Male), Uttarakhand, 1901-2011

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.

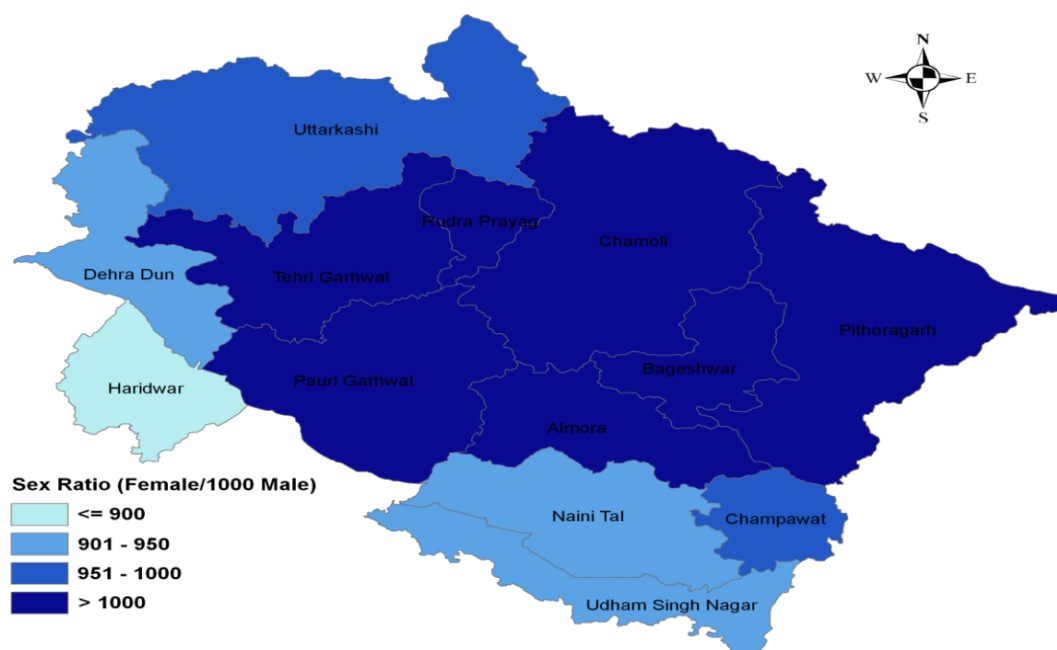
**Map 6: Sex Ratio (Female/1000 Male) across Districts of Uttarakhand, 2011**

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.

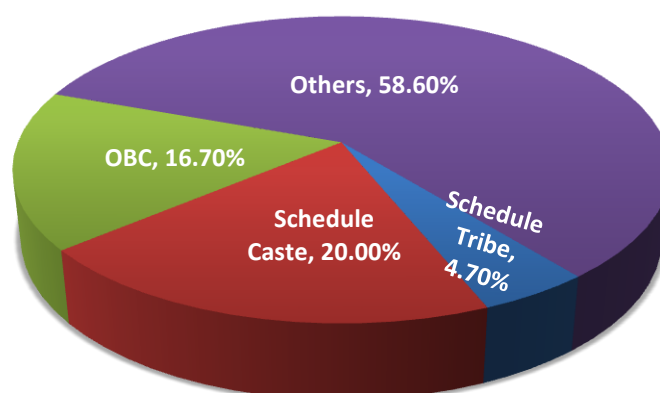


Figure 12: Proportion (%) of Population by Social Group, Uttarakhand, 2009-10

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).

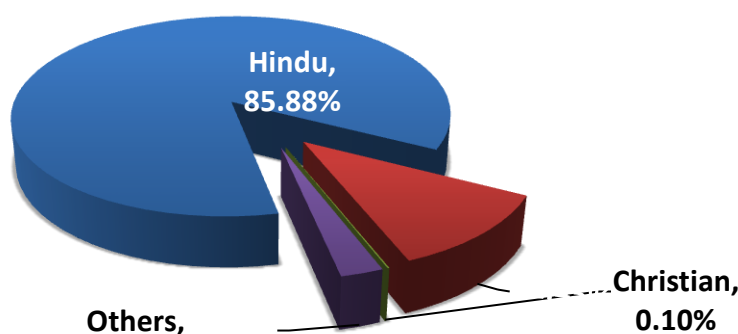


Figure 13: Proportion (%) of Population by Religious Group, Uttarakhand 2009-10

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.

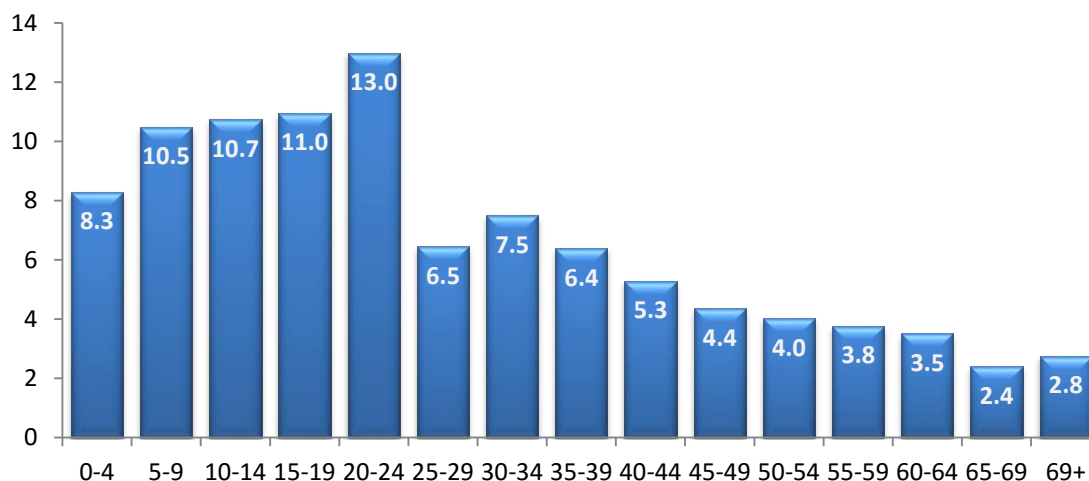


Figure 14: Proportion (%) of Population by Age Group, Uttarakhand, 2009-10

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).

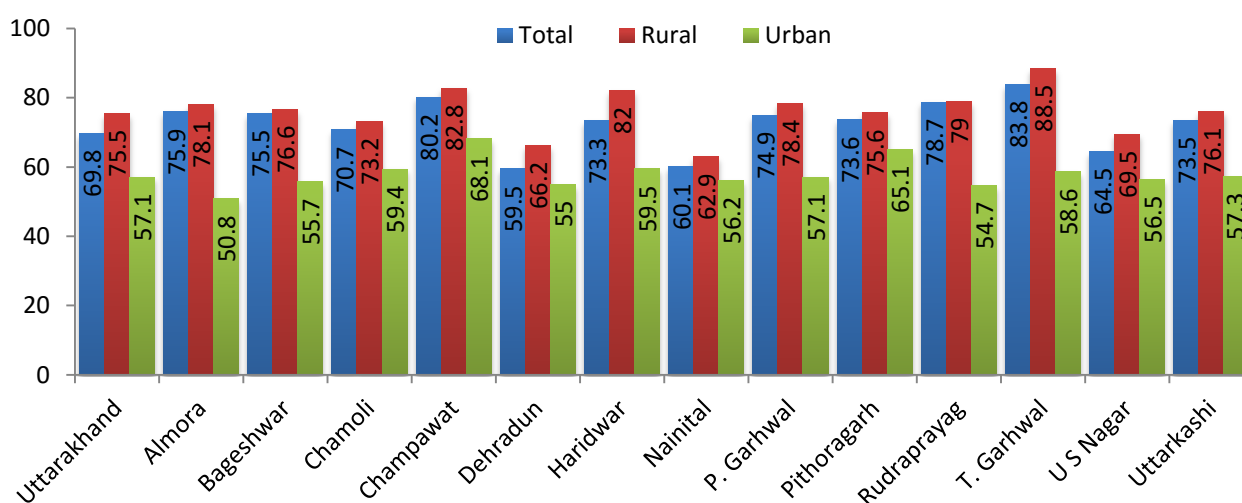


Figure 15: District-wise Dependency Ratio (%) of Uttarakhand, 2010

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

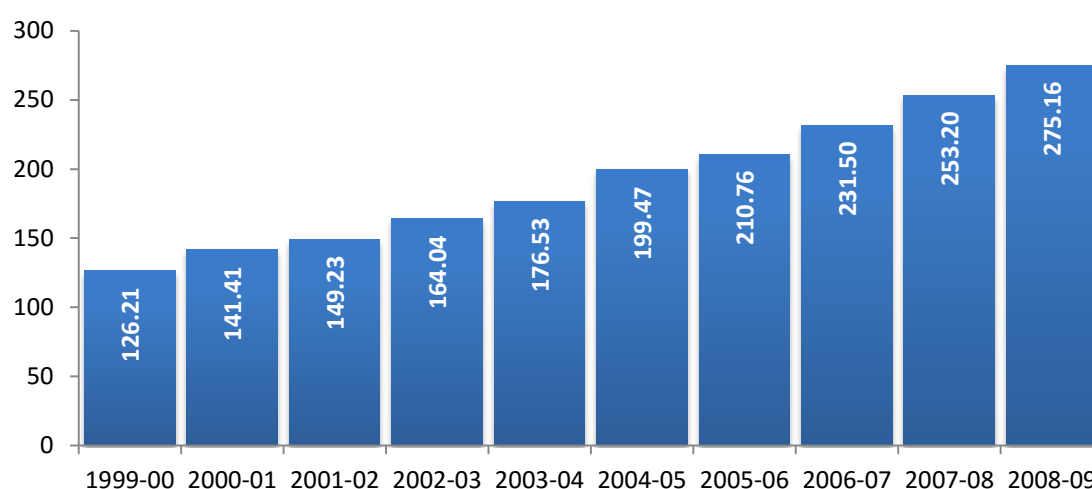


Figure 16: Trends in Gross State Domestic Product at Factor Cost (Rs.'00 crores) in Uttarakhand, at 1999-00 Prices

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).

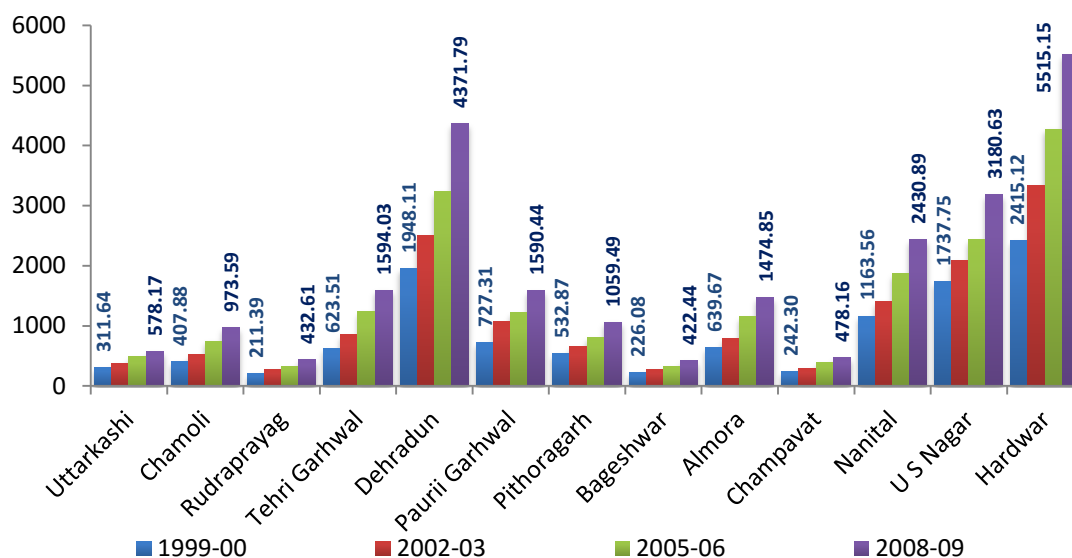


Figure 17: GDDP (Crore Rs.) across districts of Uttarakhand, at 1999-00 Prices

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.

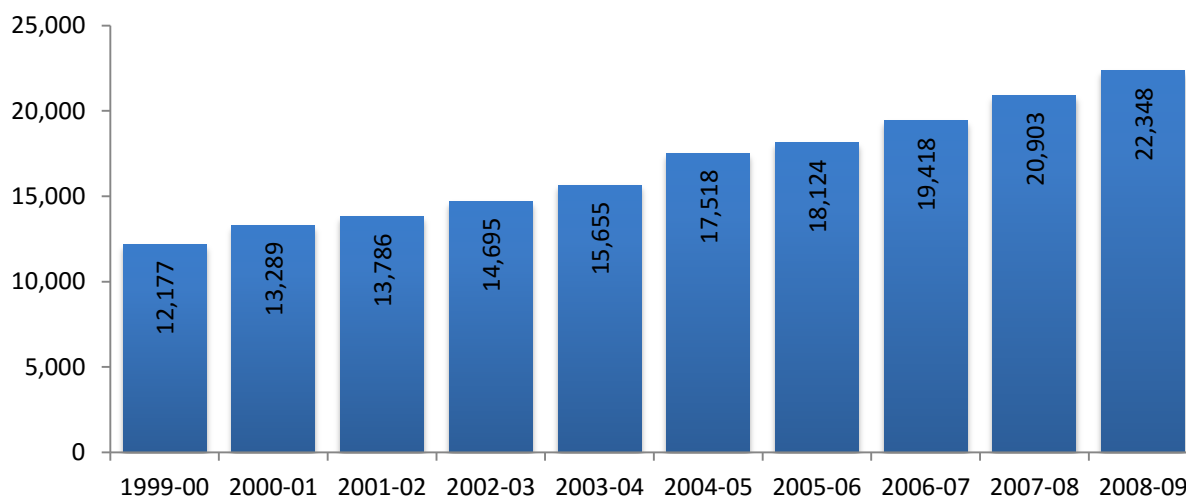


Figure 18: Per Capita GSDP (Rs.) in Uttarakhand at 1999-00 Prices

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.

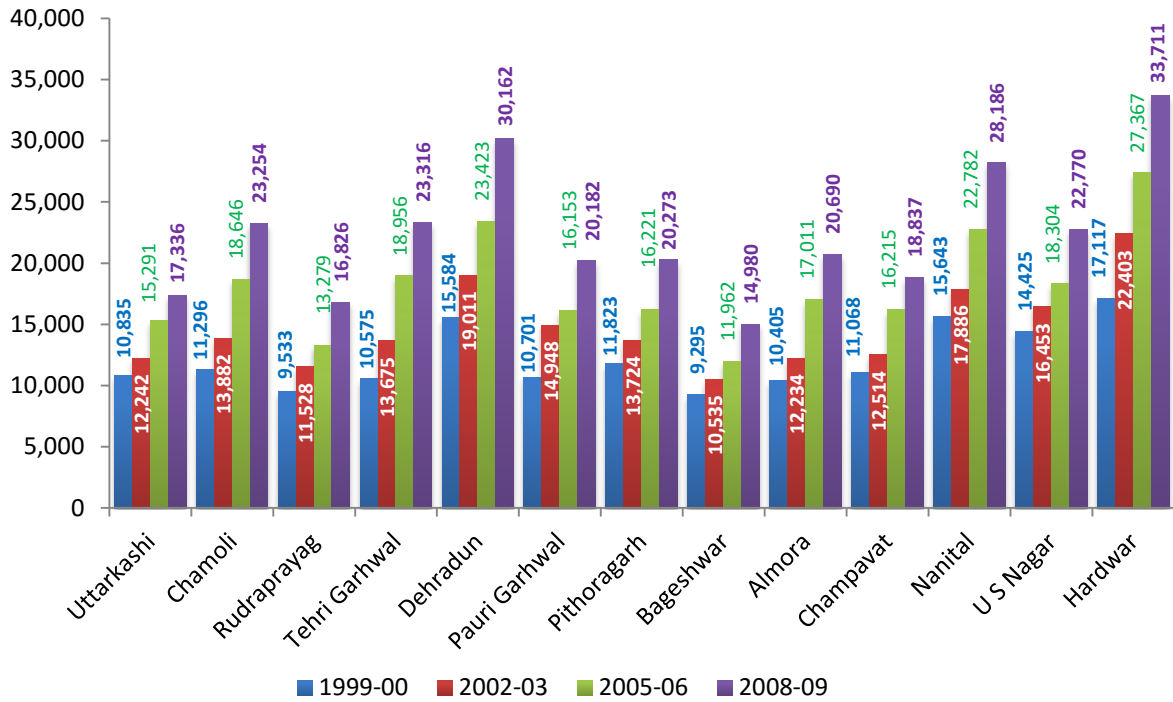


Figure 19: Per Capita GDP at constant 1999-00 Prices (in Rs.) across Districts

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.

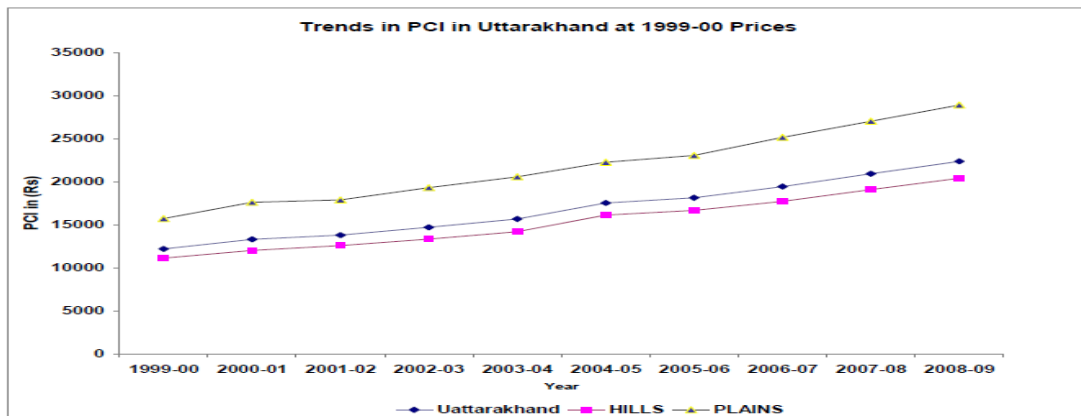


Figure 20: Trends in Per Capita Income in Uttarakhand (at 1999-00 Prices)

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.

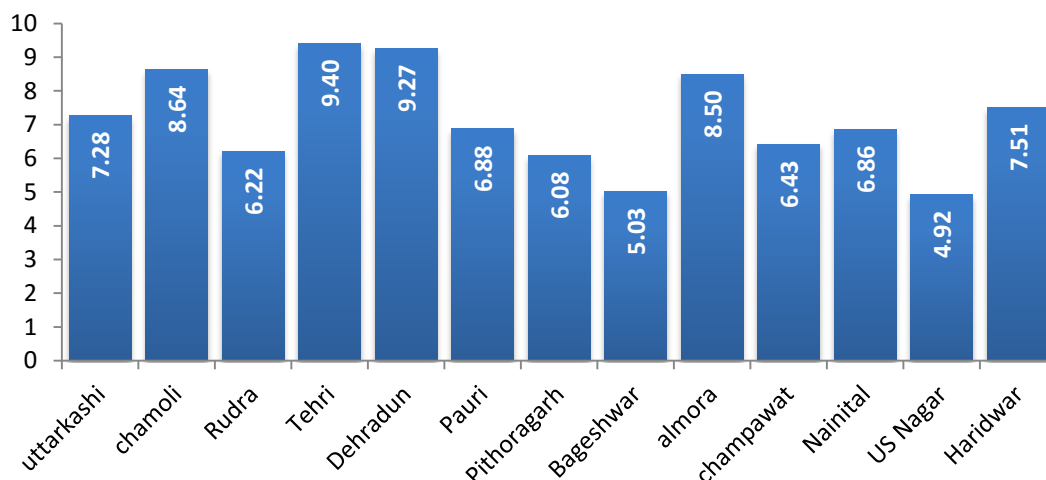


Figure 21: CAGR (%) of Per Capita Income across Districts of Uttarakhand, 1999-2009

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.

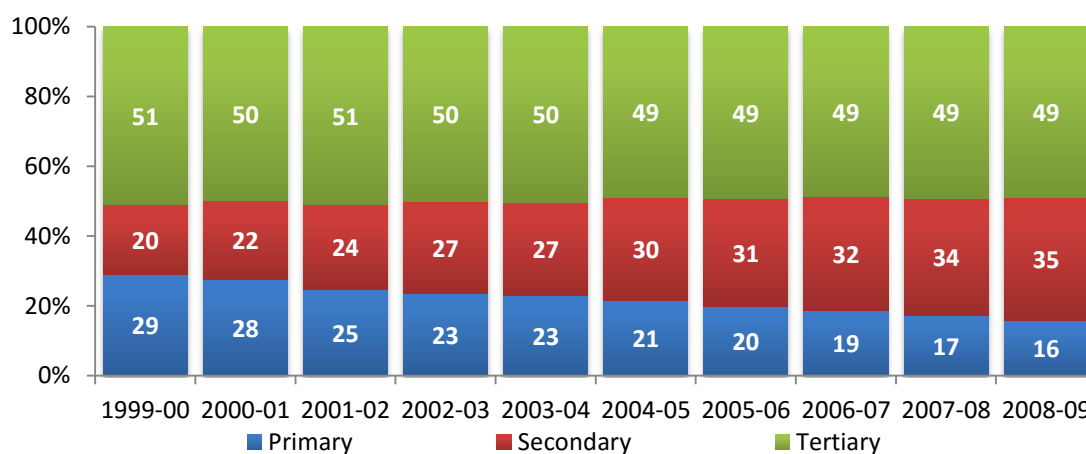


Figure 22: Sectoral Composition of GSDP (%), Uttarakhand, 1999-00 to 2008-09

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.

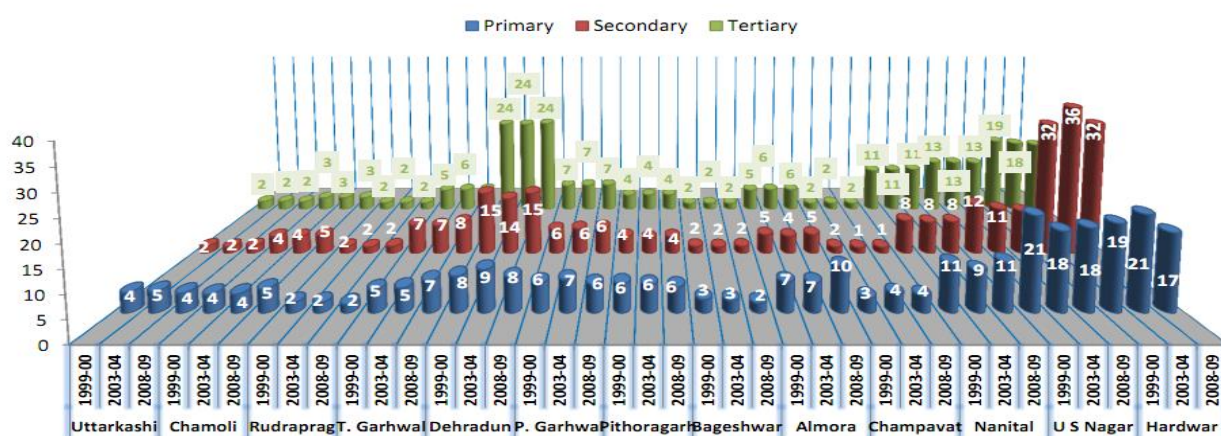


Figure 23: Sectoral Composition of GSDP (%) across Districts of Uttarakhand, 1999-2008

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.

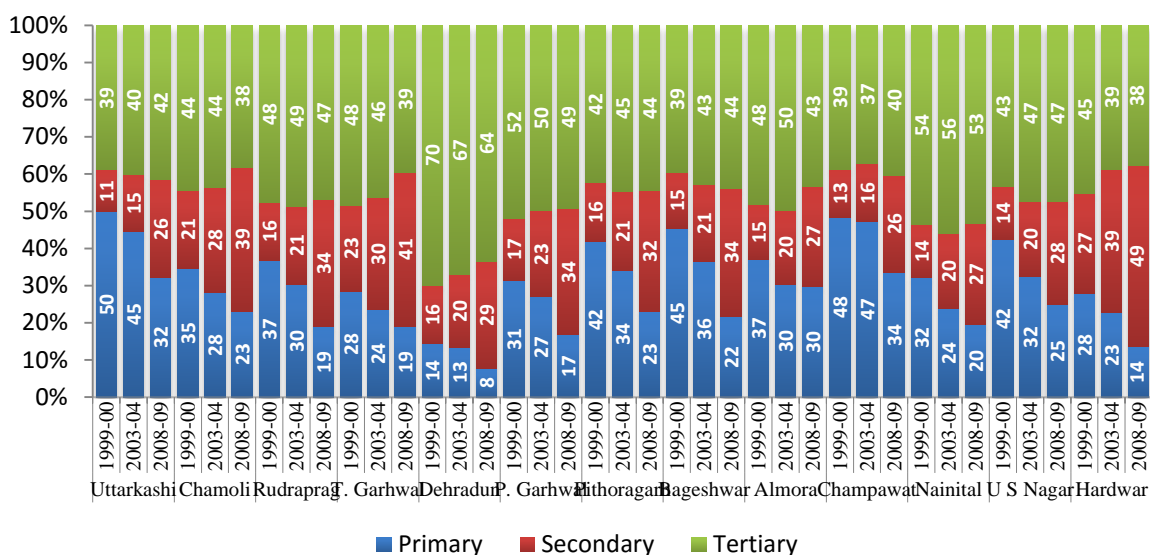


Figure 24: Sectoral Composition of GDDP (%) across Districts, 1999-00 to 2008-09

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.

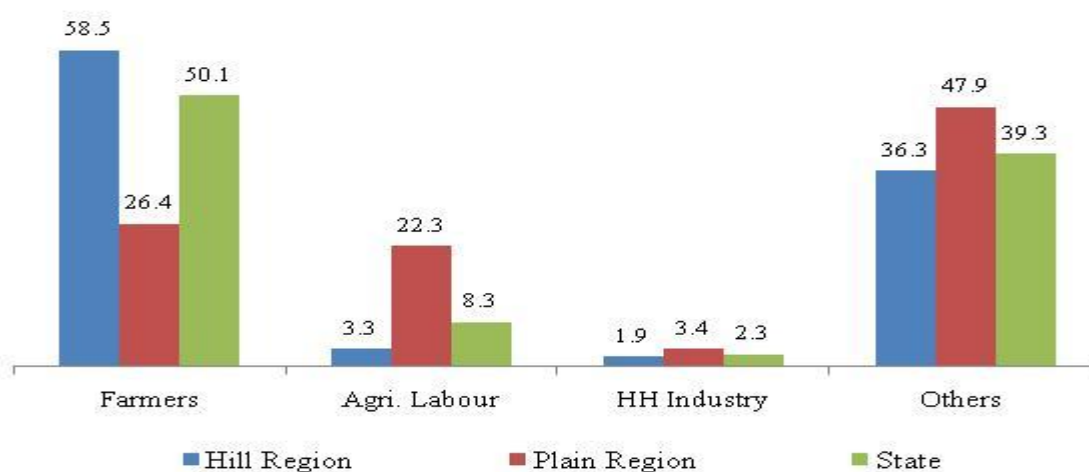


Figure 25: Proportion (%) of Main Workers by Occupational Category, Uttarakhand, 2011

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 workforce 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.

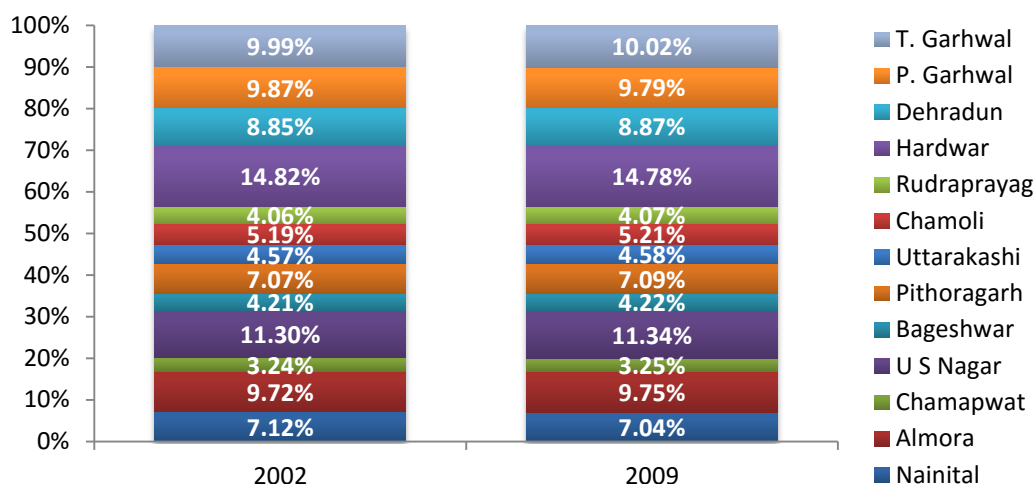


Figure 26: District-wise percentage distribution of BPL Households in Rural Uttarakhand

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 and 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.

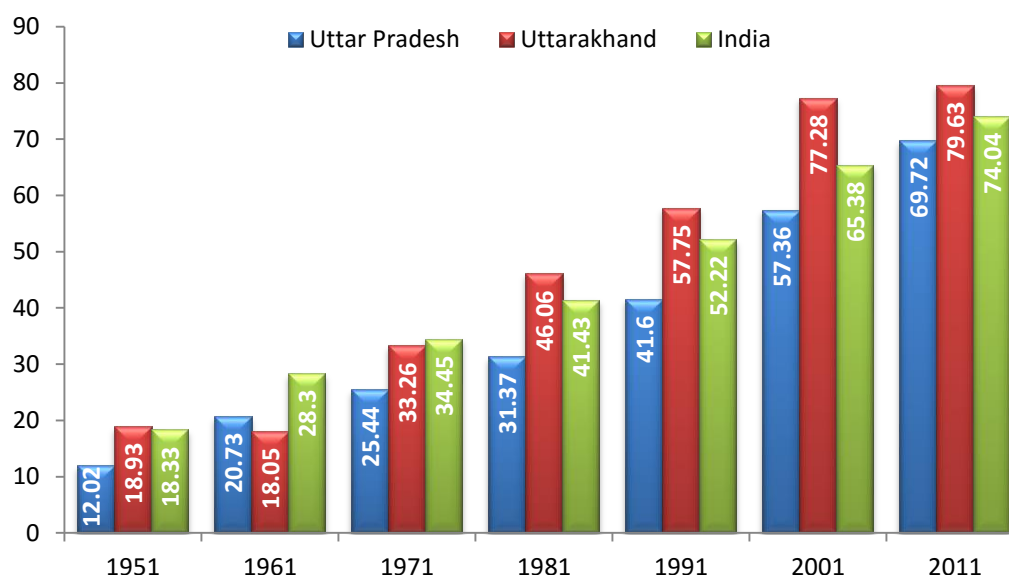


Figure 27: Literacy Rate (%), Uttarakhand, Uttar Pradesh and India, 1951-2011

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.

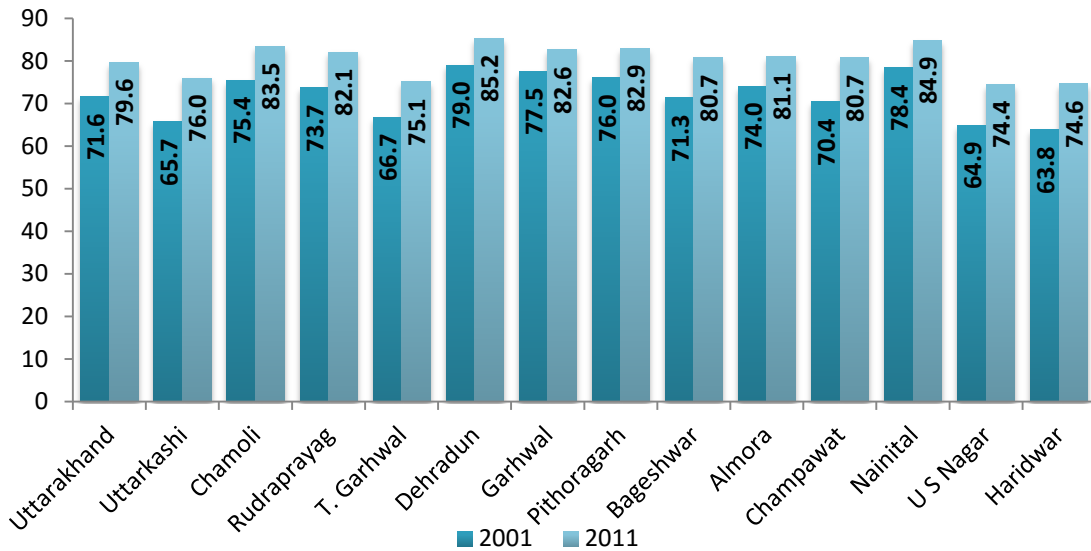


Figure 28: Literacy (Person) Rate (%) across Districts of Uttarakhand, 2001-2011

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.

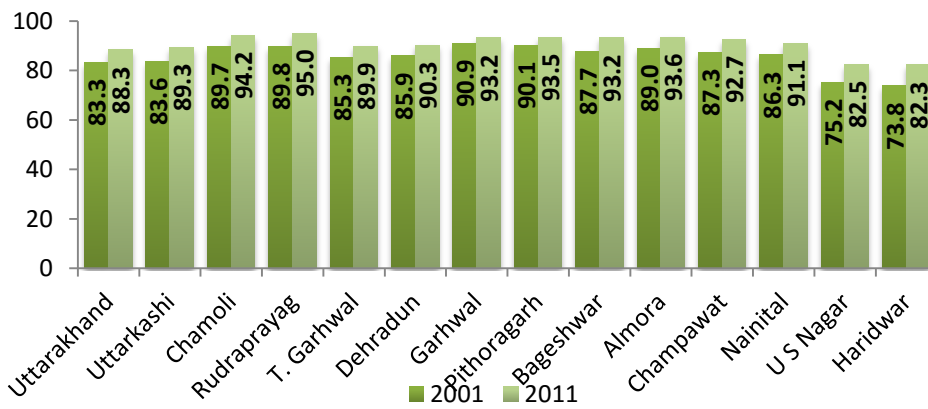


Figure 29: Literacy (Male) Rate (%) across Districts of Uttarakhand, 2001-2011

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.

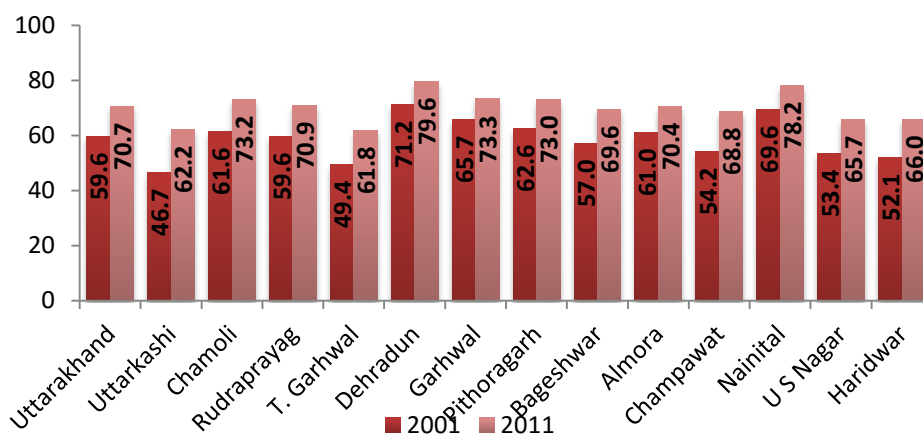


Figure 30: Literacy (Female) Rate (%) across Districts of Uttarakhand, 2001-2011

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 for higher 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.

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

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

Total Schools - Private										
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	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

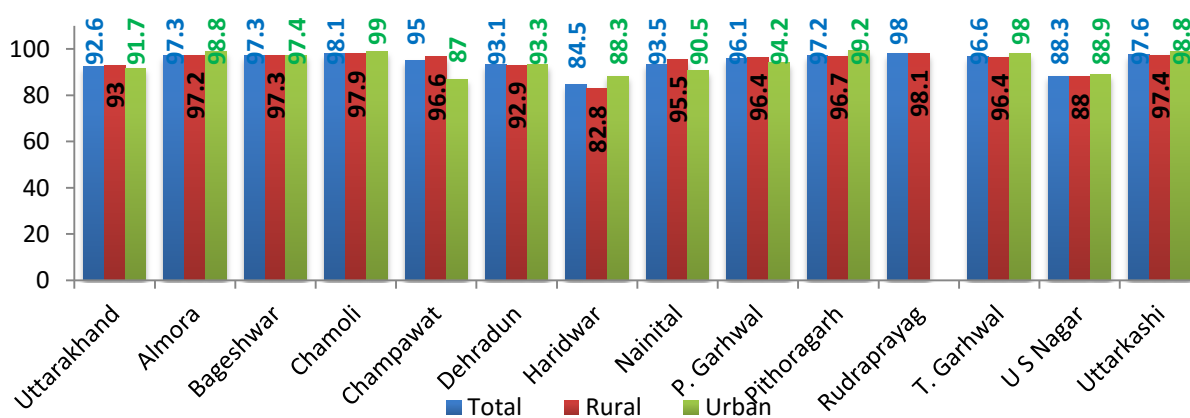
Gross and net enrollments at primary and secondary level are shown in Table 11. At the State level, gross enrollment ratio (GER) at primary level in 2009-10 was 106.18, while net enrollment ratio (NER) was 86.52. At the upper primary level, GER and NER were 91.18 and 61.86 respectively.

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)-3¹² 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 in 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.

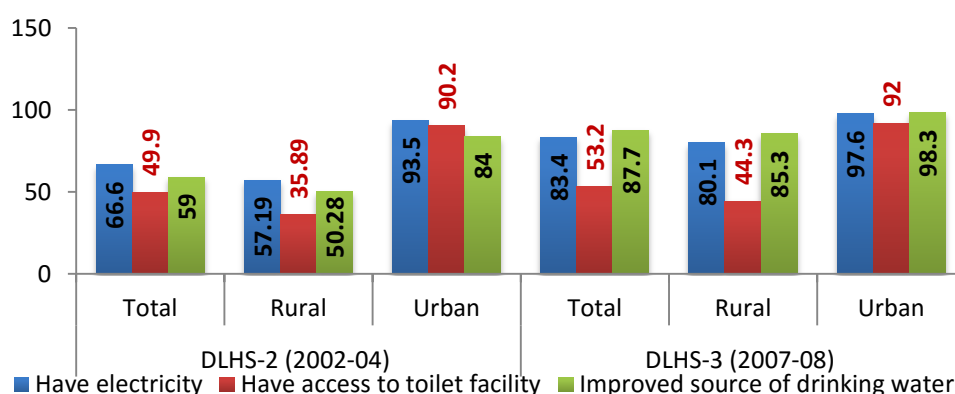


Figure 32: Proportion of Households having electricity, access to toilet facility and improved source of drinking water, Uttarakhand

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.

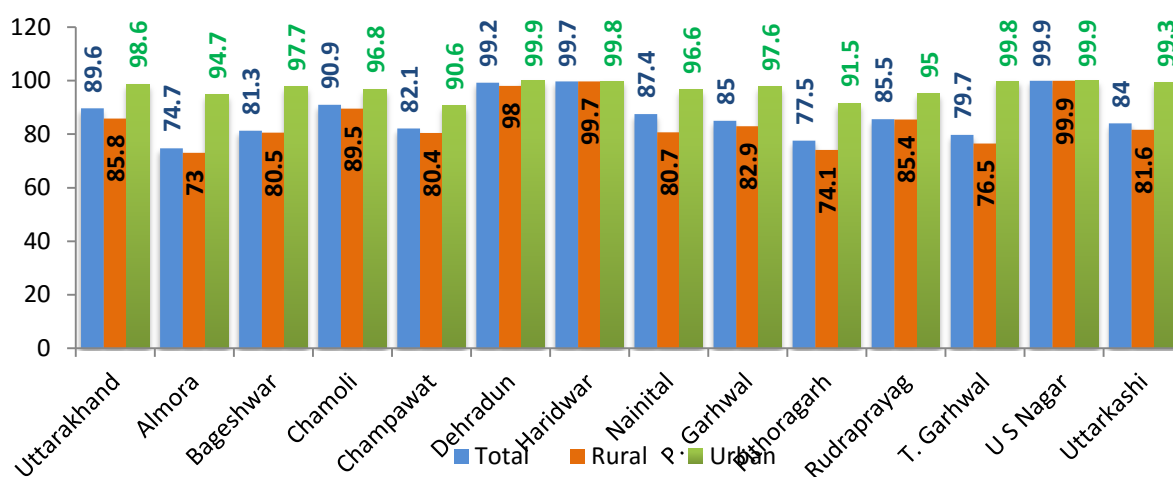


Figure 33: Households having Improved Source of Drinking Water (%), Uttarakhand, 2010

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.

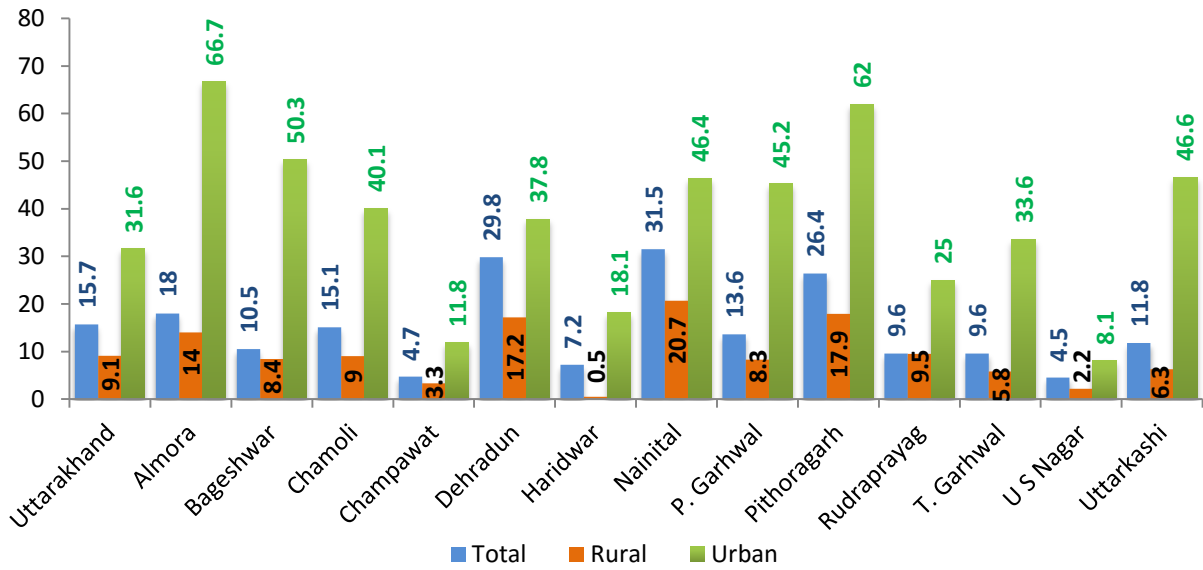


Figure 34: Households treating water to make it Safer for Drinking (%), Uttarakhand, 2010

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.

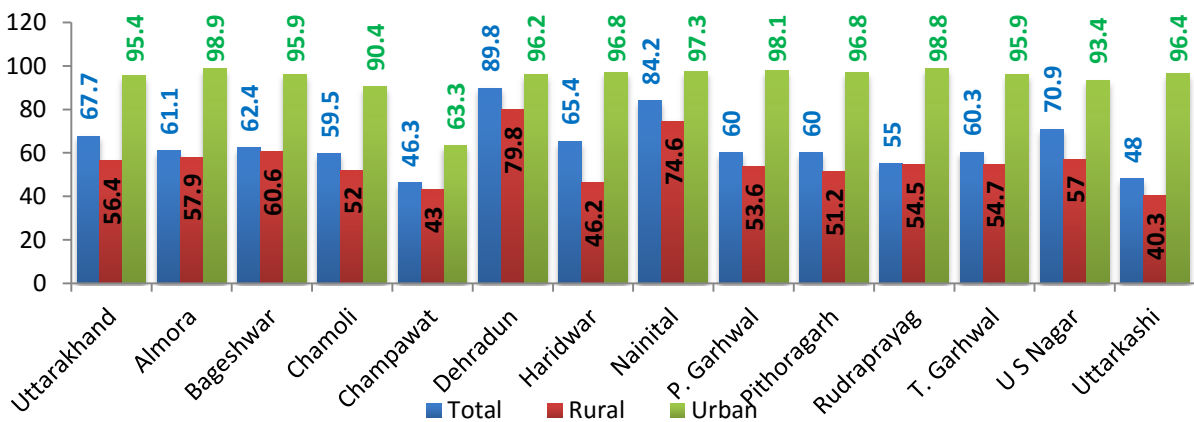


Figure 34: Households having Access to Toilet Facility (%), Uttarakhand, 2010

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 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 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 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.

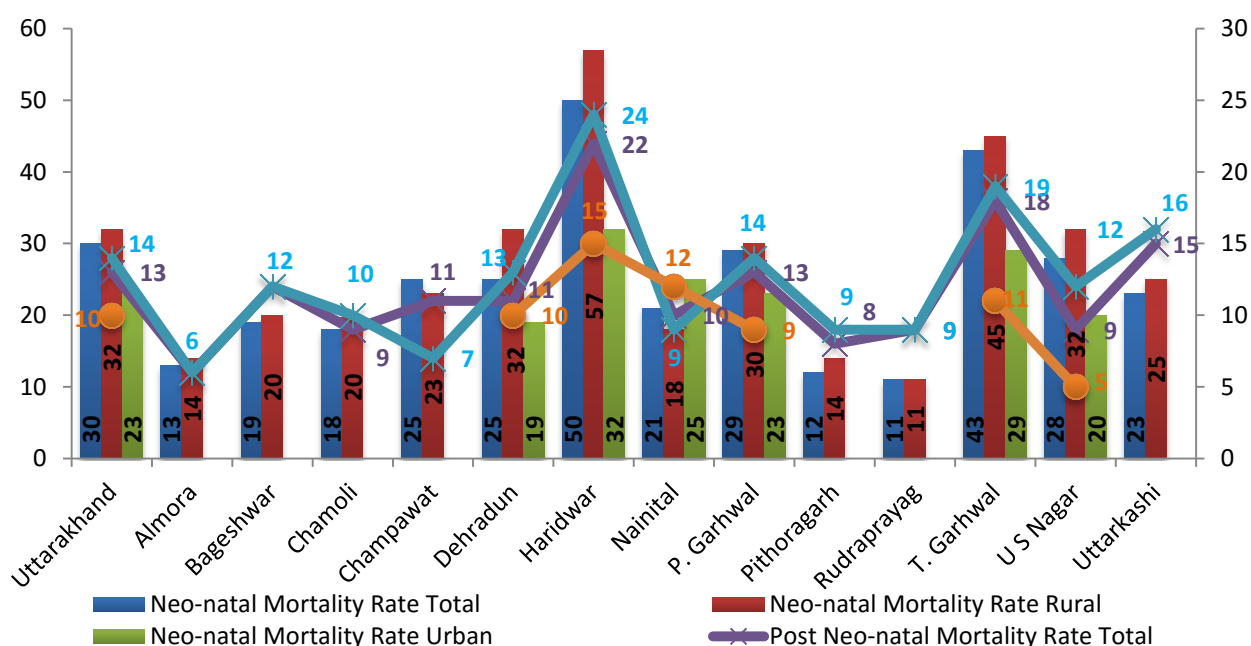


Figure 35: Neo-natal and Post-natal Mortality Rate, Uttarakhand, 2010-11

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.

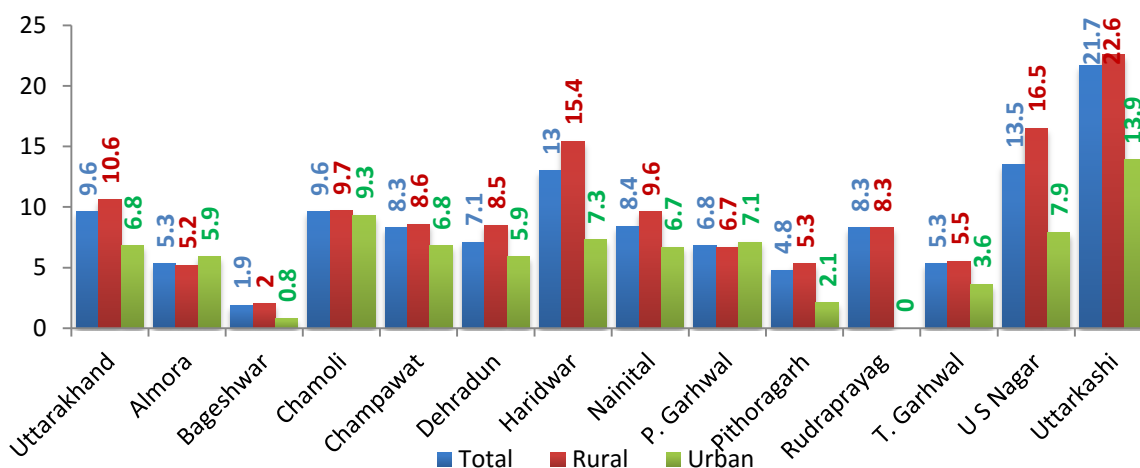


Figure 36: Children suffering from Diarrhea (%), Uttarakhand, 2010-11

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.

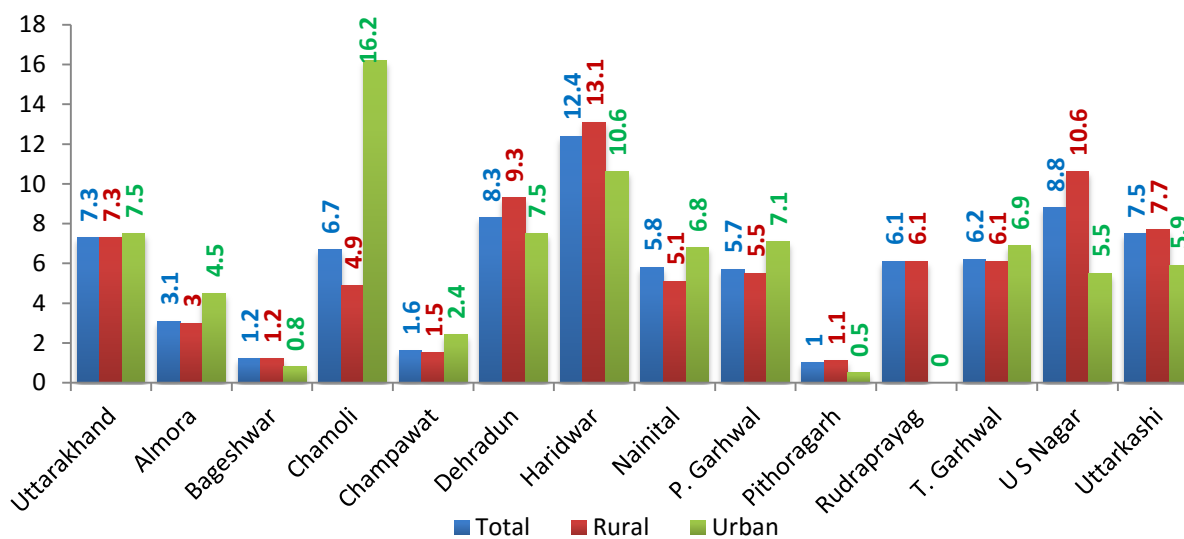


Figure 37: Children suffering from Acute Respiratory Infection (%), 2010-11

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 districts than the plain districts. Further, Kumoan region has relatively better health status than the Garhwal region. Apparently Hariwar district has poorest health status among all the districts.

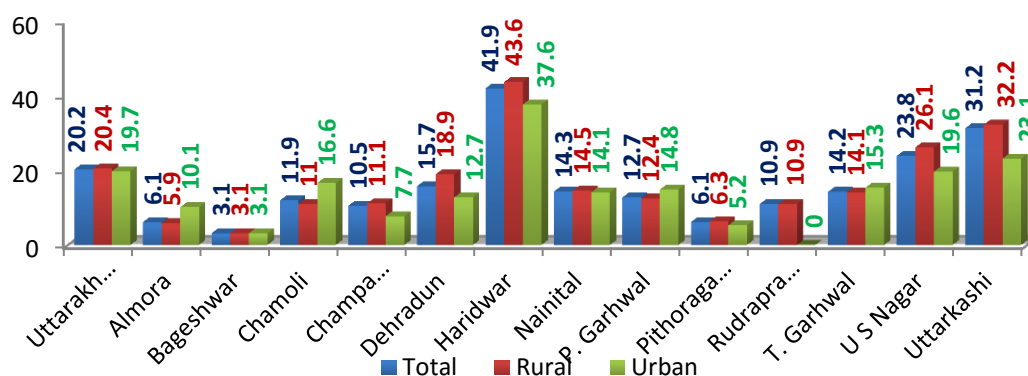


Figure 38: Children suffering from Fever (%), Uttarakhand, 2010-11

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.

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

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

State/districts	Census 2011			Projected Population (Million)					
	(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 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

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.

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 invest 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 workforce 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 invest 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 workforce 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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