

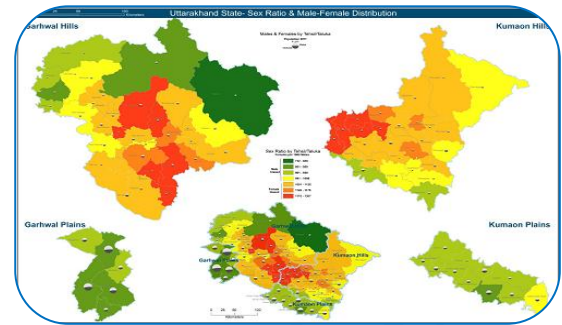


CHANGING PATTERN OF SEX RATIO (1901-2011) OF GARHWAL REGION AND ITS IMPACTS

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ABSTRACT:

Declining sex ratio is an issue of grave concern in India. The social and economic relationship in a region is affected by the sex composition of the population. An analysis of sex ratio is important for the study of demographic study of any region. This study is totally based on the secondary data. The changing pattern of sex ratio in Garhwal region has been calculated from 1901 to 2011 and its impacts has been analyzed. The correlation between the sex ratio and the socio economic factors has also been assessed. The special pattern of sex ratio in Garhwal has shown by the chropleth map.

KEYWORDS: Sex Ratio, impact, remedies, chropleth map, changing pattern

1. INTRODUCTION-

The present study is an analysis of sex ratio in Garhwal region from 1901 to 2011 the current census. Garhwal region is the northwestern region and the administrative division of the Uttarakhand state which have an area of 32449 sq km. The population of the region is 5857294, which is 0.48% of the total population of India and 58.07% of the Uttarakhand state. It comprises seven districts namely, Chamoli, Pauri, Tehri, Uttarkashi, Rudraprayag, Dehradun and Haridwar. Dehradun and Haridwar are the districts which have the plain area whereas the remaining five districts are mainly mountainous.

2. OBJECTIVES-

The main objectives are-

- 1) To examine the trend of the sex ratio of the Garhwal region from 1901 to 2011.
- 2) To find out the relation of literacy and the urbanization with sex ratio.
- 3) To find out district wise spatial distribution of sex ratio in Garhwal region 2011.
- 4) To analyze the impact of the declining sex ratio on Garhwal region.

3. METHODOLOGY AND DATA COLLECTION

In this study the sex ratio of last 110 years is highlighted. The data which has been used in this study is basically of secondary type. Statistical abstract of Uttarakhand 2015-2016 and the census handbook of 2011 have been used as the source of the data of the population. A comparison has also been made among India, Uttarakhand and Garhwal which is presented by the table and line diagram. The Spearman's rank of correlation has been used to show the relation between sex ratio and the literacy & urbanization. The spatial variation in the sex ratio among the districts has also been analyzed with the help of the arc GIS 10.2. The fourth objective has been fulfilled by the review of literature.

4. STUDY AREA-

The administrative division of Uttarakhand has been selected for the study which is situated between from 77° 33" E to 80° 60" E longitudes and from 29° 31.9' N and 31°26" N latitude.

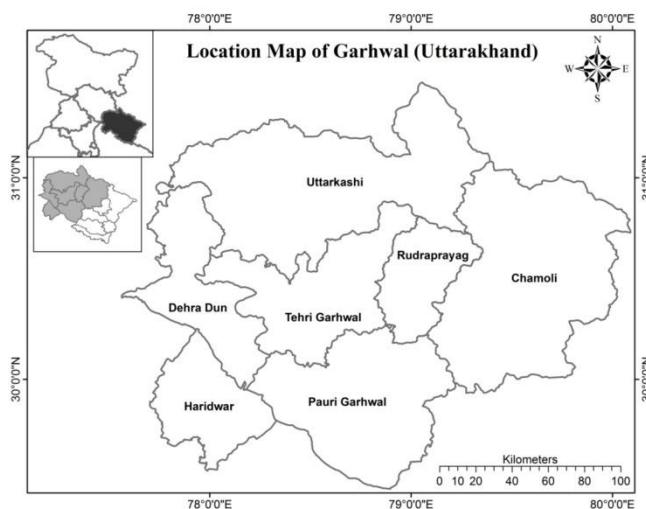


Figure-1

Uttarakhand is the northern state of India which is divided into two administrative divisions, Garhwal and Kumaun. In this research paper we have selected Garhwal region for our study. Garhwal is famous for many of its forts. The four pilgrims of Uttarakhand are situated in this Garhwal Himalaya. It occupies an area 32928 sq.km, which is 61.57% of the total area of Uttarakhand. . It extends from Haridwar in the south up to Himalayas in the north. According to the census 2011, it has a population of 5857294 which is 0.48% of the total population of India and 58.07% of the Uttarakhand state. The population density of the area is 180 persons per sq. km.

5. DISCUSSIONS

5.1) A comparison between the changes in the sex ratio of Garhwal region and India-

Table 1 indicates the analysis among the Garhwal division, Uttarakhand and India from 1901 to 2011. In 1951, the sex ratio of Garhwal region was equal to the ratio of the country (946). In the whole century it was 1951 when the highest sex ratio was recorded while in 1941 there was lowest sex ratio in Garhwal region. But it showed the improvement (except 1911, 1931 and 1941) while in the same duration the sex ratio was in the decreasing order in India. In 1961, there was a point when the sex ratio of the Garhwal region surpassed the sex ratio of India. In the year 1961 and 1971 the sex ratio of Garhwal region was higher than the country but up to 1991, it was in ascending order so was the Garhwal region. In 2001 it was 949 which were quite higher than the nation 933. According to the census 2011 India have recorded the (7) increase while the Garhwal division recorded it as 3 from the 2011 census.

5.2) Decadal comparison among India, Uttarakhand and Garhwal region

Table-1

Year	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001	2011
India	972	964	955	950	945	946	941	930	934	926	933	943
Increase/Decrease		-8	-9	-5	-5	1	-5	-11	4	-8	7	7
Uttarakhand	831	907	916	913	907	940	947	940	936	936	962	963
Increase/Decrease		76	9	-3	-6	33	7	-7	-4	0	26	1
Garhwal Region	931	919	926	924	905	946	968	939	927	927	949	952
Increase/Decrease		-12	17	-2	-19	41	22	-29	-12	0	22	3

Source- Statistical Abstract of Uttarakhand 2014-2015

5.3) A comparison between the changes in the sex ratio of Garhwal region and Uttarakhand

If we compare the sex ratio of Garhwal region and Uttarakhand it indicates that since 1971 the sex ratio of Garhwal was more than that of Uttarakhand. It was highest in 1961 (968) and lowest in 1941 (905) in Garhwal. 1971 was the year when the sex ratio of the Garhwal region went down by 1 point (939) from Uttarakhand. During 1971 to 1991 the gender was declining both in Garhwal and Uttarakhand but it was below the sex ratio of Uttarakhand. After 2001 there was an increasing trend in the sex ratio of Garhwal which was 949 and 952 respectively. But the sex ratio of Garhwal was below Uttarakhand.

5.4) Changes in the sex ratio within the districts of Garhwal region:

Table 2 indicates that the sex ratio in all the districts of Garhwal have decreased from 1901 to 2011 except Dehradun and Haridwar. There is an increase of sex ratio in Haridwar and Dehradun districts. The sex ratio has always been in 4 digits during 1901 to 2011 in Rudraprayag district. Uttarkashi is the only district where sex ratio has declined drastically from 1197 to 958 during the period of 1901 to 2011. In 2011 Haridwar and Dehradun have recorded their highest sex ratio in 110 years.

Table-2

Year	Chamoli	Uttarkashi	Haridwar	Tehri	Pauri	Rudraprayag	Dehradun
1901	1,032	1,197	864	1,015	1,032	1,027	733
1911	1,036	1,026	823	1,026	1,036	1,033	696
1921	1,084	1,035	818	1,034	1,084	1,070	648
1931	1,069	1,017	820	1,017	1,069	1,053	673
1941	1,077	976	802	976	1,077	1,047	644
1951	1,092	993	806	1,122	1,137	1,146	715
1961	1,103	964	796	1,202	1,163	1,176	766
1971	1,035	899	803	1,179	1,119	1,173	770
1981	1,020	881	817	1,081	1,091	1,111	811
1991	982	918	846	1,047	1,058	1,094	843
2001	1,016	941	868	1,049	1,106	1,115	887
2011	1,019	958	879	1,078	1,103	1,114	902

Source- Statistical Abstract of Uttarakhand 2014-2015

5.5) Trends of the sex ratio of the Garhwal region from 1901 to 2011.

5.5) a. Sex ratio during 1901-1931

If we look at the figure 2, it is very clear that there is mix kind of trend in the sex ratio of Garhwal region. Many of the fluctuations can be easily seen in the pattern of sex ratio in Garhwal region. After 1901, there is a fall in the sex ratio in 1911. In the year of 1921 it again shows an increase of 7 numbers and then decreased by 2 points in 1931. While, there is an increasing order in the sex ratio of the Uttarakhand state (except 1931) during this period of time. In 1901, the sex ratio was about 831 which increased up to 913 till 1931. A continuous fall in the sex ratio of India is quiet visible by the figure 2.

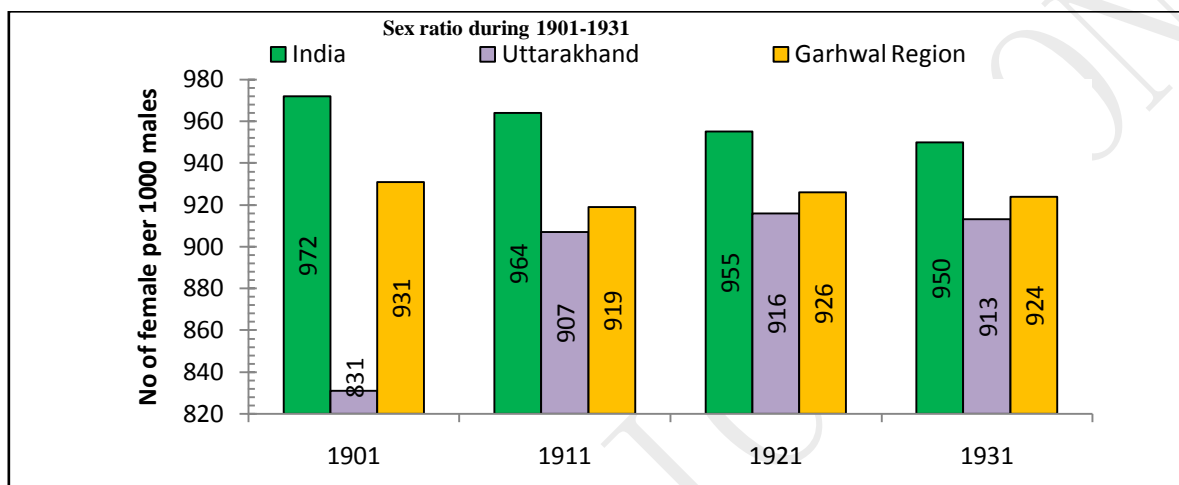


Figure-2

5.5) b Sex ratio during 1941-1971

Figure 3 indicates that there is increasing trend in the pattern of sex ratio of Garhwal in this time period (exception 1971). It increased by 34 numbers during four decades. If we look for the highest sex ratio of Garhwal region it becomes clear that it was 1961 when sex ratio of Garhwal was 968 which was the highest number of the whole century. If we look at the figure 3 it is pointed out that there is also increasing trend in the sex ratio of Uttarakhand. It was 907 in 1941 which increased up to 947 by 1961 but it was declined in the 1971 by 7 females. A mix kind of sex ratio can be seen in the India during this time period. In the initial two decade of the duration recorded the increasing order but in the last two decades recorded the decreasing trend in the sex ratio.

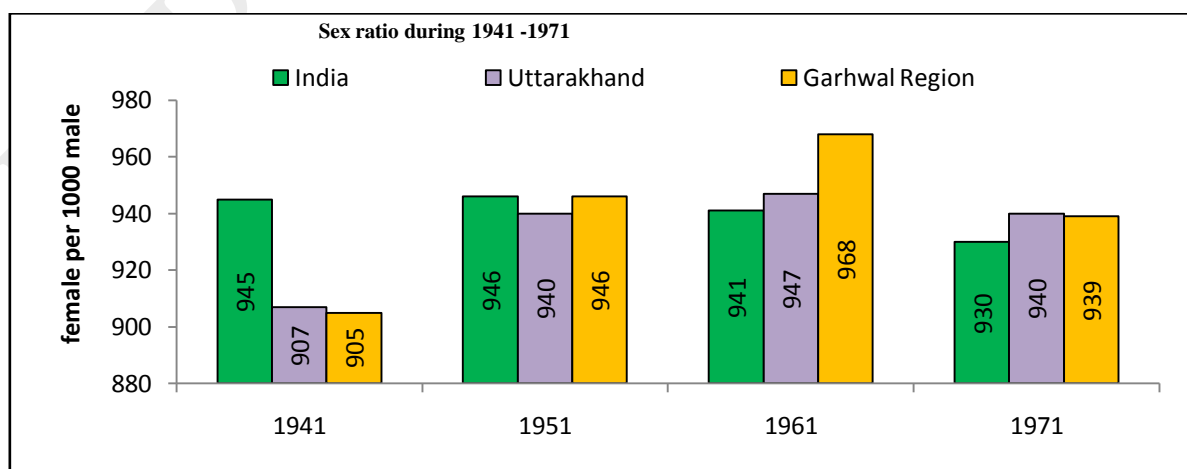


Figure- 3

5.5) c Sex ratio during 1981-2011

The figure 6 indicates that there is an increasing order in the sex ratio among the three - India (1991), Uttarakhand and Garhwal region. The sex ratio of Garhwal increased from 927 (1981) to 952 (2011). The trend of sex ratio also showed an increasing order. It has grown from 934 to 943 till 2011 in India.

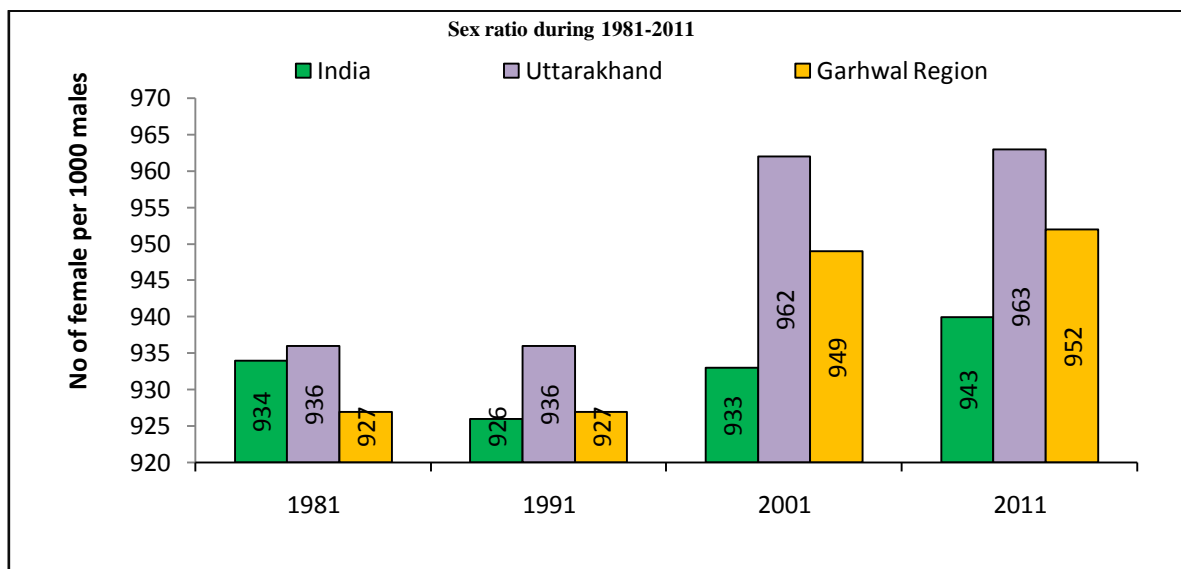


Figure-4

5.6) d Overall Trend of the sex ratio: India, Uttarakhand & Garhwal region

There can be seen a mix and fluctuating kind of trend in the overall sex ratio of Garhwal region. The lowest sex ratio was recorded in 1941 while the highest sex ratio was observed in 1961. In 2011 the numbers of the females have remained 48 less than of the male to be balanced. Figure no 5 indicates that the sex ratio of Uttarakhand has improved gradually during the period of 110 years. It was lowest in 1901 (831) and highest in the year 2011 which is a positive indicator for the state. If we look at the overall trend of the sex ratio of India it is quiet visible by the fig 5 that there is a continuous fall in it. It was highest (972) in 1901, which has remained 943 in 2011 after a gradual decrease.

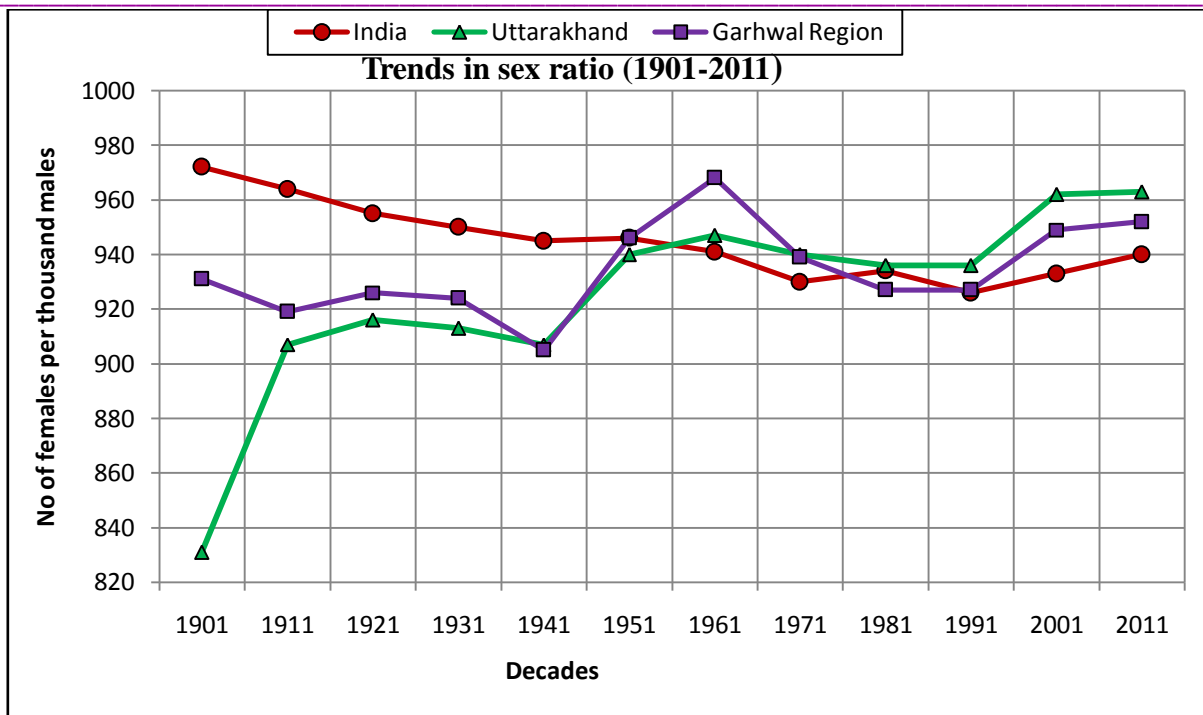


Figure-5

5.6) Special pattern of the Literacy rate in Garhwal region

The overall literacy rate of Garhwal is 69.95%. But it fluctuates from one district to another district from 73.43 to 84.25%. All the districts are categorized into 3 groups as follows.

5.6) a. Low Literacy rate- the districts which have the literacy rate below 75 % are included into this category. Low literacy rate is found only in Haridwar.

5.6) b. Moderate Literacy rate- In this category the districts which have the literacy rate between 75 to 80 % are included. Tehri, Pauri and the Uttarkashi district are considered into this category.

5.6) c. High Literacy rate- Dehradun, Chamoli and Rudraprayag districts have the highest sex ratio. In this category the districts which have the sex ratio above 80% are included.

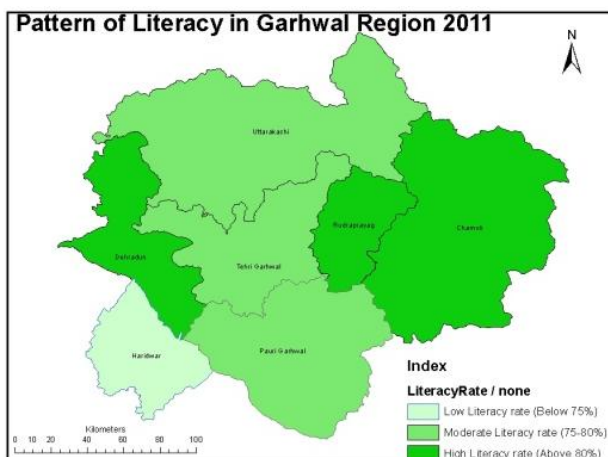


Figure 6

Correlation between sex ratio and the literacy

Formula of the correlation -

$$\begin{aligned}
 P &= 1 - 6 \sum d_i^2 / n (n^2 - 1) \\
 &= 1 - 6 * 42 / 7(7^2 - 7) \\
 &= 0.875
 \end{aligned}$$

The correlation between the sex ratio and the literacy is 0.875 in Garhwal region which indicates that there is highly positive correlation between these two. If the Literacy increases the sex ratio will be increased.

Table-3

Sr. No	District	Sex Ratio (2011)	Rank	Literacy rate	Rank	D	D ²
1	Dehradun	902	6	84.25	1	5	25
2	Pauri	1103	2	77.5	4	-2	4
3	Tehri	1078	3	76.4	5	-2	4
4	Uttarkashi	958	5	75.8	6	-1	1
5	Chamoli	1019	4	82.65	2	2	4
6	Rudraprayag	1114	1	81.3	3	-2	4
7	Haridwar	880	7	73.43	7	0	0
		N=7					ΣDi ² =42

5.7) Spatial Pattern of the Urbanization in Garhwal region

The overall urbanization in Garhwal region is 32.63% in 2011 which varies within the districts from 4.09 to 55.52%. The spatial pattern of the urbanization is given below-

5.7) a. Low Urbanization- In this category Rudraprayag and Uttarakshi districts are included where the urbanization is very low 7.36 and 4.09 % respectively. The low connectivity of roads and the rugged mountains discouraged the urbanization in the area.

5.7) b. Moderate Urbanization- Tehri Pauri and Chamoli districts fall under this category. The percentage of the urbanization in these districts is 11.33, 16.39 and 15.17 respectively.

5.7) c. High Urbanization

There are two districts where the urbanization is very high- Haridwar and Dehradun. Proper transport network and the plain terrain encouraged the high urbanization in this area. Dehradun district has the highest urbanization of the region which is 55.52% while Haridwar has 36.66% of urbanization.

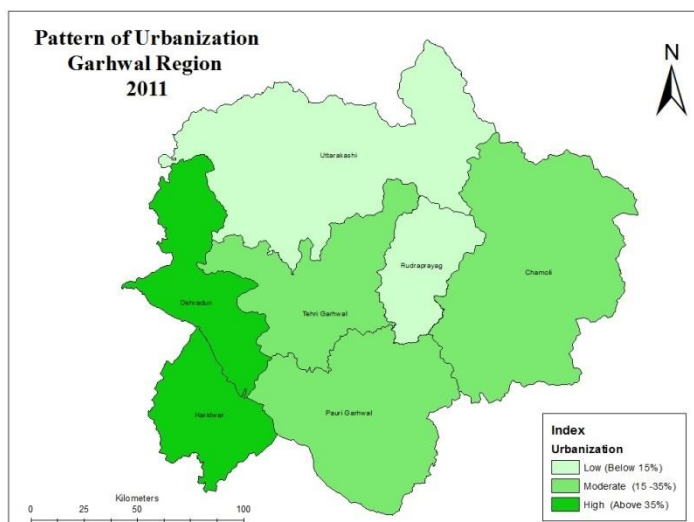


Figure -7

5.8) Correlation between sex ratio and the Urbanization

The correlation between sex ratio and the urbanization is calculated -0.74. It indicates that urbanization and the sex ratio are negatively correlated which means that as the urbanization increases the sex ratio decreases automatically.

Formula of the correlation -

$$P = 1 - 6 \sum d_i^2 / n (n^2 - 1)$$

$$= 1 - 6 * 92 / 7 (7^2 - 7)$$

$$= -0.7360$$

Table-4

Sr. No	District	Sex ratio	Rank	Urbanization	Rank	D	D ²
1	Chamoli	1090	3	15.17	4	-1	1
2	Uttarkashi	958	5	7.36	5	0	0
3	Hardwar	880	7	36.66	2	5	25
4	Rudraprayag	1114	1	4.09	7	-6	36
5	Tehri	1048	4	11.33	6	-2	4
6	Dehradun	902	6	55.52	1	5	25
7	Pauri	1103	2	16.39	3	-1	1
		N=7					ΣDi ² =92

5.9) Special pattern of the sex ratio in Garhwal-

According to the census 2011, the sex ratio of the Garhwal region is 952. If we go through the table 4 it is pointed out that the sex ratio of whole Garhwal varies from 879 to 1021 from one district to another district. All the districts of Garhwal can be categorized into 3 groups.

5.9) a. Low sex ratio- The districts which have the sex ratio below 950 are included into this category. Dehradun and Haridwar districts have the sex ratio below 950.

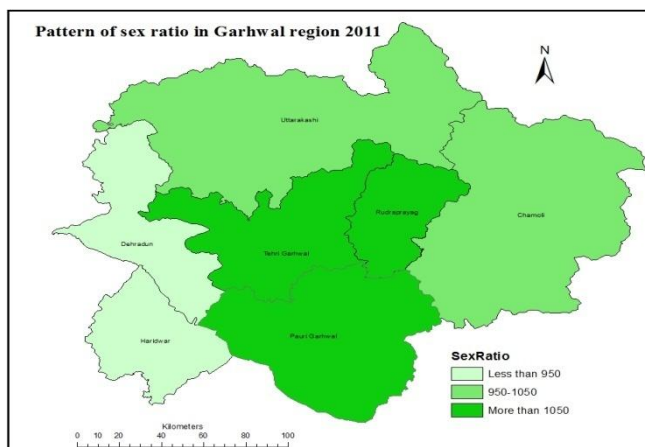


Figure 8

5.9) b. Moderate sex ratio-

The districts which have the sex ratio between 950-1050 are included into this category. Chamoli and Uttarkashi have the moderate kind of sex ratio.

5.9) c. High sex ratio-

The districts which have the sex ratio above 1050 are included into this category. The high sex ratio has been recorded in the districts of the Pauri, Tehri and Rudraprayag districts.

Table -5

Sr. No	Categories	Districts
1.	Low sex ratio	Haridwar, Dehradun
2.	Moderate sex ratio	Chamoli, Uttarkashi
3.	High sex ratio	Tehri, Pauri, Rudraprayag

Source- Census handbook 2011

6. Impact of the declining sex ratio on Garhwal region-

1. The excess of males tends to lowering age of the marriage of the female (22.17 Annual Health Survey 2010-2011) which may lead to increased fertility and population growth.
2. An adverse sex ratio leads to the social emergence of many social and moral evils like rape, prostitution, impairing the morale of workers in near future.
3. It also witnessed in human development report (2018) on gender inequality index that India record 130th rank which shows the significance of gender discrimination.

7. RESULTS

If we look at the overall trend of the sex ratio in the region it indicates that there is an increase in the sex ratio from 1901 to 2011 in the region. But it is very fluctuating during the decades. If we look at the distribution pattern of the sex ratio it shows that there is low sex ratio in the more urbanized districts of the Uttrakhand i.e. Dehradun and Haridwar. There is high sex ratio in the middle districts of Garhwal region. The correlation between the sex ratio and the literacy rate is highly positive which is showing that the areas where the sex ratio is high there will be the high sex ratio of the region. The correlation between the sex ratio and the urbanization is highly negative which indicates that if the urbanization will increase the sex ratio will decrease or urbanization will decrease the sex ratio will decrease itself.

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