



## Region wise Analysis of Gender Composition over Time

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**ABSTRACT**

The composition of population by gender is one of the primary demographic characteristics of human population. The present study is an attempt to examine this gender composition in India for the last three decades. For this purpose the country was divided into six distinct regions and the data pertaining to gender composition for the three decades 1991, 2001 and 2011 were studied. A comparative analysis of the regions over time was undertaken using the two way analysis of variation. A significant difference was observed in the value of sex ratio for the selected regions. Undoubtedly, the southern region scored well on this front with Kerala outshining in this region. In contrast, the performance of the western region was far below expectation with Gujarat registering the highest percentage decline from the year 1991 to 2011. Moreover, the lowest performer in terms of sex ratio for the three decades has been the national Capital.

**KEYWORDS**

Sex ratio, regions, time, ANOVA

**Introduction**

India is the second most populous country in the world, with over 1.21 billion people (2011 census) and more than a sixth of the world's population. It is projected to be the world's most populous country by 2025. More than 50% of its population is below the age of 25 and more than 65% below the age of 35. It is expected that, in 2020, the average age of an Indian will be 29 years, compared to 37 for China and 48 for Japan; and, by 2030, India's dependency ratio should be just over 0.4. Despite this projected demographic advantage for the country, the gender composition remains an important concern in India's demography (Bhat 2002a; Croll 2000; Kundu and Sahu 1991; Nair 1996). The distribution pattern of male and female in a population affects the relative roles and economic relationships. There are different tools to measure the gender equity in a population. Sex ratio is one such widely used tool for cross sectional analysis. Sex ratio defined as the number of females per 1000 males in the population, is an important social indicator to measure the extent of prevailing equity between males and females in a society at a given point of time. In the words of Kofi Annan, former UN Secretary General gender equity is a precondition for meeting the challenges of reducing poverty, promoting sustainable development and building good governance. A change in the sex composition largely reflects the underlying socio-economic and cultural patterns of a society in different ways. Though, this ratio in India was almost normal during independence, but gradually it started declining. Pointedly, the last two decades have shown slight improvement over time. The ratio which had been hovering around 930 females to 1000 males for the last few decades was revealed to be 943 as per the recent census of India, 2011. The issue is multifaceted and no single explanation can be advocated for it. Several researchers have examined the trends and factors affecting the female to male ratios (Agnihotri 1995, 2000; Bhat 2002a; Guillot 2002). A preferred sex composition for children by couples has been the main reason for decline of female to male ratio (Clark 2000; Griffith et al. 2000). According to Mallik (2002), some of the programmes promote the transition to small families through strategies that voluntary support outright two-child norm by social and economic incentives. In another study by Croll (2002), it is argued that without change in gender reasoning, the rapid fertility decline and imposed smaller family size means that daughters are subjected to new trade-offs. Hence a study pertaining to the worsening of India's sex composition requires a close monitoring of the sex-ratio trends in the country. It is against this contextual framework that the

study purports to examine the following objectives:

1. Analyse the status of sex ratio for different states of the country over the three decades.
2. Examine the disparity in sex ratio on a regional basis.
3. Evaluate the significance of sex ratio for different regions and time period.

**Methodology:**

To achieve the above stated objectives the collection of data was done retrospectively from the reports of Census of India for the last three decades. The data relating to sex ratio for all the states and union territories was studied for the period of 1991, 2001 and 2011. For the ease of calculation the states of the country were divided into six regions namely Northern region, North Eastern region, Eastern region, Central region, Western and Southern region respectively on the basis of their geographic location. The average sex ratio for these regions was calculated and compared against the national average. These regional averages were plotted for the three decades. In order to check the significance of difference of sex ratio between the various regions and time the two way analysis of variance technique was applied to these averages with the following null hypotheses:

$H_{01}$ : There is no significant difference in average sex ratio in six different regions.

$H_{02}$ : There is no significant difference in average sex ratio for the three decades.

To perform the statistical analysis all the data were computerized and SPSS version 12.0 program (SPSS Inc, Chicago, USA) was used. P value of less than 0.05 was considered significant.

**Results and Discussion:**

Table -1 presents the sex ratio for different states and union territories in India for the three decades 1991, 2001 and 2011. The number of States and Union Territories registering an upward trend have risen from 23 in 2001 to 27 in 2011. While Kerala, Puducherry, Tamil Nadu and Andhra Pradesh have been amongst the best and consistent performers in terms of sex ratio, Jammu and Kashmir and Gujarat have been consistently poor performers over time. Delhi is at the bottom in this table with the lowest sex ratio for the past two decades though it has managed to improve by 47 units on this count

in the last decade. The table even highlights the region wise classification of these states so as to facilitate the further analysis.

Table 1: State wise sex ratio for last three decades

State	1991	2001	2011	Percentage change from 1991 to 2011
Northern Region				
Haryana	865	861	879	1.62
Himachal Pradesh	976	968	972	-0.4
Jammu and Kashmir	-	892	889	-
Delhi	827	821	868	4.96
Punjab	882	876	895	1.47
Rajasthan	910	921	928	1.98
North Eastern Region				
Arunachal Pradesh	859	893	938	9.2
Assam	923	935	958	3.79
Manipur	958	978	992	3.55
Megalaya	955	972	989	3.56
Mizoram	921	935	976	5.97
Nagaland	886	900	931	5.08
Sikkim	878	875	890	1.37
Tripura	945	948	960	1.59
Eastern Region				
Andaman Nicobar Island	818	846	876	7.09
Bihar	907	919	918	1.21
Jharkhand	922	941	949	2.93
Orissa	971	972	979	0.82
West Bengal	917	934	950	3.6
Central Region				
Chhatisgarh	985	989	991	0.61
Madya Pradesh	912	919	931	2.08
Uttar Pradesh	876	898	912	4.11
Uttarakhand	936	962	963	2.88
Western Region				
Goa	967	961	973	0.62
Gujarat	934	920	919	-1.6
Maharashtra	934	922	929	-0.5
Southern Region				
Andhra Pradesh	972	978	993	2.16
Karnatka	960	965	973	1.35
Kerala	1036	1059	1084	4.63
Puducherry	979	1001	1037	5.92
Tamilnadu	974	987	996	2.26
India	927	933	943	1.73

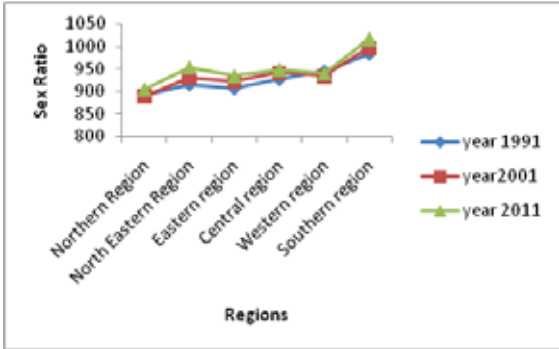
Table -2 provides the brief summary of the average values of the sex ratio for different regions. It is apparent from the table that Southern, Western and Central region have higher average values of sex ratio in comparison to national average where as Northern, Northern Eastern and Eastern regions have a less value of the same. Pointedly Southern region has been taking a lead in the table and it is incredible to note that the toll has touched a figure of 1016.6 in the year 2011.

The national average recorded an increase of 1.27 % from 1991 to 2011. The highest growth of 4.22 % was seen in north east region followed by Southern (3.29%), Eastern (3.02%) and Central region with 2.37%. Northern region is lagging in this growth(1.48%). The highest growth of 9.19% was observed from 1991-2011 in the state of Arunachal Pradesh in the North eastern region. It is pertinent to note that the Western region accounted for a negative percentage growth during 1991 to 2011. Even in this region Gujarat has been the worst performer with a highest percentage decline of 1.6 over the last 3 decades. The graph bears a testimony to this stated fact.

Table -2: Region wise sex ratio for three decades

Region	Sex Ratio in India			Percent increase from 1991 to 2011
	1991	2001	2011	
Northern Region	892	889.83	905.17	1.48
North Eastern Region	915.63	929.5	954.25	4.22
Eastern region	907	922.5	934.4	3.02
Central region	927.25	942	949.25	2.37
Western region	945	934.33	940.33	-0.49
Southern region	984.2	998	1016.6	3.29
India	927	933	943	1.73

Chart -1: Region wise sex ratio



As is evident from table-2 that there is a vast gap in sex ratio in different regions and for different time periods, though it is improving with time. To find out the significance of this difference we applied two way ANOVA to the average sex ratio. The results are summed up in table-3.

Table- 3: Analysis of variance table

Source of Variation	SS	df	MS	F	P-value	F critical
Regions	17684.78	5	3536.955	51.15658	8.43E-07	3.325835
Time	1426.762	2	713.3811	10.31795	0.003705	4.102821
Error	691.3979	10	69.13979			
Total	19802.94	17				

The p-value was reported as 0.000 for regions and 0.003 for

time which are less than 0.05, hence null hypotheses were rejected for both the parameters i.e. region and time and it can be concluded that the sex ratio is significantly different in regions and in the various decades.

### Conclusion

A key observation has been that the number of States and Union Territories registering an upward trend have risen from 23 in 2001 to 27 in 2011 which in itself is appreciable. Despite this, the rise has not been uniform for the country. The study pointed towards the significant disparity existing in the sex ratio in the different regions for the last three decades, specially the north-south divide. This fact has also been statistically supported through the ANOVA technique. The major findings reflect that amongst the southern states, Kerala backed by Puducherry have been faring well with the ratio crossing the 1000 mark over time. Perceptible increase has been witnessed across all the states of North East with Arunachal Pradesh taking the lead (9.19%). The journey of economy in terms of sex ratio has a long way to go and efforts directed at improvement in this ratio need to be designed and implemented at all three levels. A regular appraisal and assessment of the sex ratio, female mortality, literacy and economic participation, empowerment of women, creating awareness about gender equality through women role models. Etc. are a few measures to improve the sex ratio.

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