

# CHANGING PATTERN OF SEX RATIO (1951-2011) OF KOKAN DIVISION AND ITS IMPACTS

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## Abstract

Declining sex ratio is an issue of serious 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 economic study of any region. This study utilizes secondary data. The changing pattern of sex ratio in Kokan region has been calculated from 1951 to 2011 and its impacts has been analyzed. The special pattern of sex ratio in Kokan region has been mapped and the correlation between the sex ratio and the socio-economic factors has been assessed.

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

## Introduction

The present study is an analysis of sex ratio in Kokan region from 1951 to 2011, the current census. Kokan region is the south western region and the administrative division of the Maharashtra state which have an area of 30,746 sq. km. The population of the region is 5857294, which is 9.28% of the total population of India and 25.46 % of the Maharashtra state. It comprises even districts namely, Mumbai City, Mumbai Suburban, Thane, Palghar, Raigad, Ratnagiri and Sindhudurg are the districts which have the plain area where as the remaining four districts are mainly mountainous.

The Kokan region, along the western coast, is Maharashtra's most populous and prosperous region. The region's capital, Mumbai is home to India's financial, banking and entertainment industries are the state's richest district. Neighbouring Thane district has one of India's highest per capita incomes. The region is known for its Alphonso mangoes and coastal fisheries.

## Objectives

The main objectives of the study are-

- 1) To examine the trend of the sex ratio of the Kokan region from 1951 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 Kokan region.

- 4) To analyze the impact of the declining sex ratio in Kokan region.

## Methodology and Data Collection

In this study the sex ratio of last 60 years is highlighted. The data which has been used in this study is secondary in nature. Statistical abstract of Kokan 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, Maharashtra and Kokan which is presented with descriptive statistics. The Spearman's rank of correlation has been used to show the relation between sex ratio and the literacy and 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.

## Study Area

The administrative division of Kokan has been selected for the study which is situated between 72.8384° E longitudes and 18.9881° N latitude.

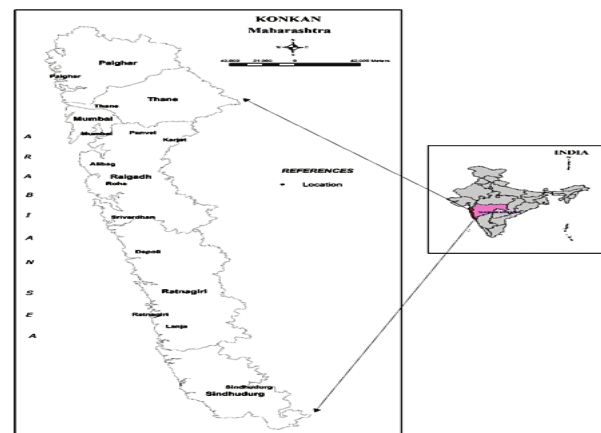


Figure-1: A map of Kokan with its sub components

Maharashtra is the South west state of India which is divided into six administrative divisions, i. e. Amravati, Aurangabad, Kokan, Nagpur, Nashik and Pune. In this research paper we have selected Kokan region for our study. Kokan is famous for many of its largest cities. Every year a large number of travelers visit Maharashtra, mainly in Kokan. It occupies an

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area 30,746 sq.km and extends from Sindhudurg districts in the south upto Palghar in the north. According to the census 2011, it has a population of 5857294.

### Discussions

#### A Comparison Between the Changes in the Sex Ratio of Kokan Region and India

Table1 indicates the analysis among the Kokan division, Maharashtra and India from 1951 to 2011. In 1951, the sex ratio of Kokan region was more (948) to the ratio of the country (946). The highest sex ratio was recorded in 1991 while the lowest sex ratio in Kokan region was recorded in 2001, although the overall population declined in the year 2001. But it showed the improvement (except 2001) while in the same duration the sex ratio was in the decreasing order in India. Study also shows the in from 1951, there was appoint when the sex ratio of the Kokan region surpassed the sex ratio of India. In the year 1951 to 2011 the sex ratio of Kokan region was continuously higher than the country but up to 2011, it was in ascending order so was the Kokan region. In 2001, it was 943 which were quite lower than 1991 but greater than the national average of 933. According to the census 2011 India have recorded the (7) increase while the Kokan division recorded it as also 7 from the 2011 census.

Decadal comparison among India, Maharashtra and Kokan region

Year	1951	1961	1971	1981	1991	2001	2011
<b>India</b>	<b>946</b>	<b>941</b>	<b>930</b>	<b>934</b>	<b>926</b>	<b>933</b>	<b>943</b>
Increase/Decrease		-5	-11	4	-8	7	7
<b>Maharashtra</b>	<b>941</b>	<b>936</b>	<b>930</b>	<b>937</b>	<b>934</b>	<b>922</b>	<b>925</b>
Increase/Decrease		-5	-6	7	-3	-12	3
<b>Kokan</b>	<b>948</b>	<b>968</b>	<b>978</b>	<b>988</b>	<b>977</b>	<b>943</b>	<b>950</b>
Increase/Decrease		20	10	10	-11	-34	7

Source- Statistical Abstract of Maharashtra 2014-2015  
(Table-1)

#### A Comparison Between the Changes In The Sex Ratio of Kokan Region and Maharashtra

If we compare the sex ratio of Kokan region and Maharashtra it indicates that since 1951 the sex ratio of Kokan was more than that of Maharashtra. It was highest in 1981 (988) and lowest in 2001 (943) in Kokan. 1951 was the year when the sex ratio of the Kokan region and Maharashtra is a 7-point difference. During 1981 to 2001 the gender ratio declined both in Kokan and Maharashtra but it was more than sex ratio of Maharashtra. After 2001 there was an increasing trend in the sex ratio of Kokan which was 950 and 925 respectively. But the sex ratio of Maharashtra was below that of Kokan.

#### Changes in the sex ratio within the districts of Kokan region:

Table 2 indicates that the sex ratio in all the districts of Kokan have decreased from 1951 to 2011 except Mumbai (Suburban) and Mumbai. There is an increase of sex ratio in Mumbai (Suburban) and Mumbai districts. The sex ratio has always been in 4 digits during 1951 to 1991 in Ratnagiri, Sindhudurg and Raigarh district. Kokan region is the only two districts Mumbai (Suburban) and Mumbai where sex ratio is very low. In 2011 Ratnagiri and Sindhudurg have recorded their highest sex ratio in 110 years

Year	Ratnagiri	Sindhudurg	Raigarh	Thane	Mumbai (Suburban)	Mumbai
<b>1951</b>	1,399	1200	1040	920	712	574
<b>1961</b>	1264	1194	1058	919	744	626
<b>1971</b>	1263	1213	1056	894	769	670
<b>1981</b>	1258	1205	1046	883	801	729
<b>1991</b>	1205	1137	1010	879	831	791
<b>2001</b>	1136	1079	976	858	822	777
<b>2011</b>	1123	1037	955	880	857	838

Source- Statistical Abstract of Maharashtra 2014-2015  
(Table-2)

#### Trends of sex ratio of the Kokan Region from 1951 to 2011

##### 5.5) a. Sex ratio during 1951-1981

If we look at the figure 2, it is very clear that there is highest sex ratio of Kokan region. From 1951, there is a rise in the sex ratio in 1911. In the year 1971 there is an increase of 10 points and rise of 10 points in 1981. However, there is a decreasing order in the sex ratio of the Maharashtra state (except 1951) during this period of time. In 1951, the sex ratio was about 941 which decrease to 937 by 1981. A continuous fall in the sex ratio of India is quite visible in figure 2.

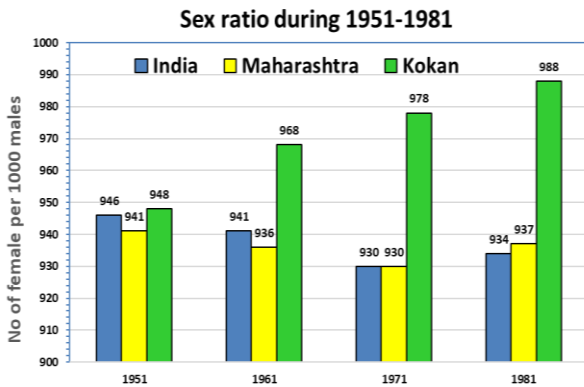


Figure-2

### b. Sex ratio during 1991-2011

Figure 3 indicates that after 1991 there is decreasing trend in the pattern of sex ratio of Kokan region in this time period (exception 2011). It increased by 7 points during three decades. If we look for the highest sex ratio of Kokan region, it becomes clear that it was in 1981 when sex ratio of Kokan was 988 which was the highest number of the selected period. If we look at the Figure 3, it is pointed out that there is also decreasing trend in the sex ratio of Maharashtra. It was 922 in 2001 and increased up to 925 by 2011 but it declined in the 2001. In the initial three decades of the duration recorded the decreasing trend however, in the last four decades witnessed an increasing trend in the sex ratio.

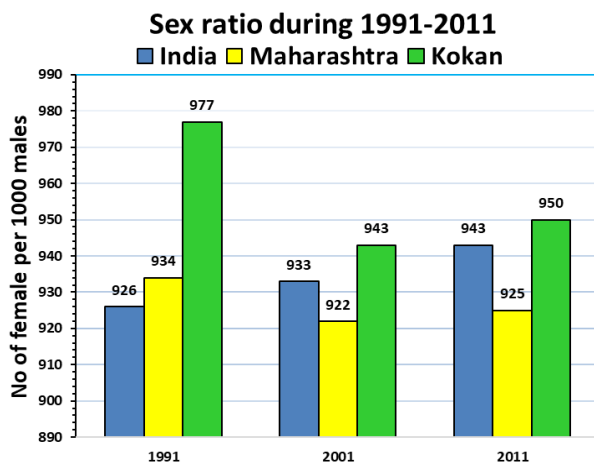


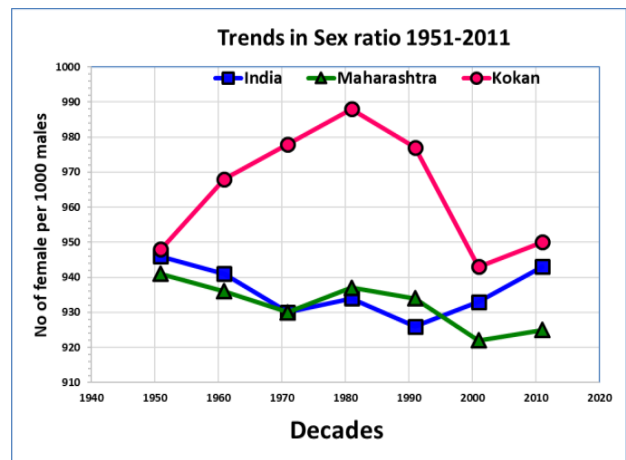
Figure- 3

### c. Overall Trend of the sex ratio: India, Maharashtra & Kokan Region

Kokan as a region witnesses a fluctuating trend in the overall sex ratio and has an overall inverted U shaped curve depicting the trend. The lowest sex ratio was recorded in selected period was in 2001 while the highest sex ratio was observed in 1981. In 2011 the numbers of the females are a mere 50 less than of the males. Figure no 5 indicates that the sex ratio of Maharashtra has improved gradually during the selected period of 70 years. It was lowest in 2011 (922) and highest in the year 1951 which is a negative indicator for the

state. If we look at the overall trend of the sex ratio of India it is quite visible in Fig. 5 that there is a continuous fall in it and after 1991 its rise again.

Figure-4: Trends in Sex ratio 1951-2011



### Special pattern of the Literacy rate in Kokan region

The overall literacy rate of Kokan region is 85.75%. But it fluctuates from one district to another district from 82.18% to 89.91%. All the districts are categorized into 3 groups as follows.

**a. Low Literacy rate-** the districts which have the literacy rate below 84 % are included into this category. Low literacy rate is found in Raigarh and Ratnagiri.

**b. Moderate Literacy rate-** In this category the districts which have the literacy rate between 84 to 86 % are included. Thane and the Sindhudurg district are considered into this category.

**c. High Literacy rate-** Mumbai and Mumbai (Suburban) districts have the highest sex ratio. In this category the districts which have the sex ratio above 89% are included.

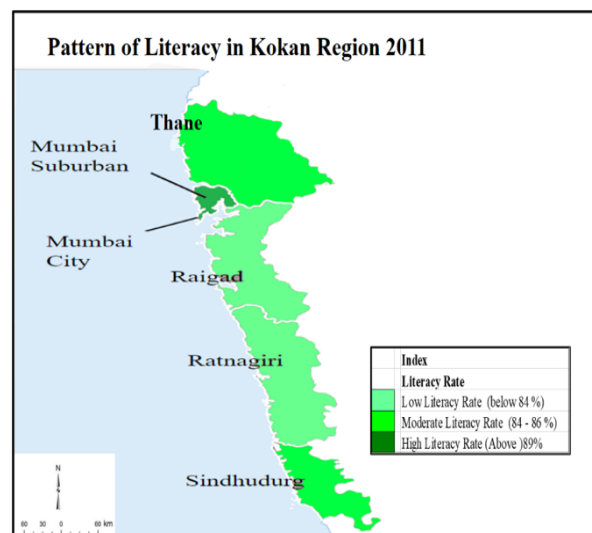


Figure 5: Pattern of Literacy in Kokan Region: 2011

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Correlation between sex ratio and the literacy

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

$$= 1 - 6 \cdot 59 / 6(6^2 - 1)$$

$$= 0.6857$$

The correlation between the sex ratio and the literacy is 0.6875 in Kokan region which indicates that there is highly positive correlation between these two. If the literacy increases the sex ratio will be increased.

Sr. No	District	Sex Ratio (2011)	Rank	Literacy Rate	Rank	D	D <sup>2</sup>
1	Mumbai (Suburban)	857	5	89.91	1	4	16
2	Mumbai	838	6	89.21	1	5	25
3	Sindhudurg	1037	2	85.56	2	0	0
4	Thane	880	4	84.53	3	1	1
5	Raigarh	955	3	83.14	4	-1	1
6	Ratnagiri	1123	1	82.18	5	-4	16
		N=6					$\sum D_i^2 = 59$

(Table-3)

### Spatial Pattern of the Urbanization in Kokan Region

The overall urbanization in Kokan region is 57.12 % in 2011 which varies with in the districts from 12.59% to 100.00 %. The spatial pattern of the urbanization is given below-

#### a. Low Urbanization

In this category Sindhudurg and Ratnagiri districts are included where the urbanization is very low, 16.32% and 12.59 % respectively. The low connectivity of roads and the rugged mountains discouraged the urbanization in the area.

#### b. Moderate Urbanization

Thane and Raigarh districts fall under this category. The percentage of the urbanization in these districts is 76.98% and 36.83% respectively.

#### c. High Urbanization

There are two districts where the urbanization is very high- Mumbai and Mumbai (Suburban). Proper transport network and the plain terrain encouraged the high urbanization in this area. Mumbai and Mumbai (Suburban) district has the highest urbanization of the region which is 100.00 %.

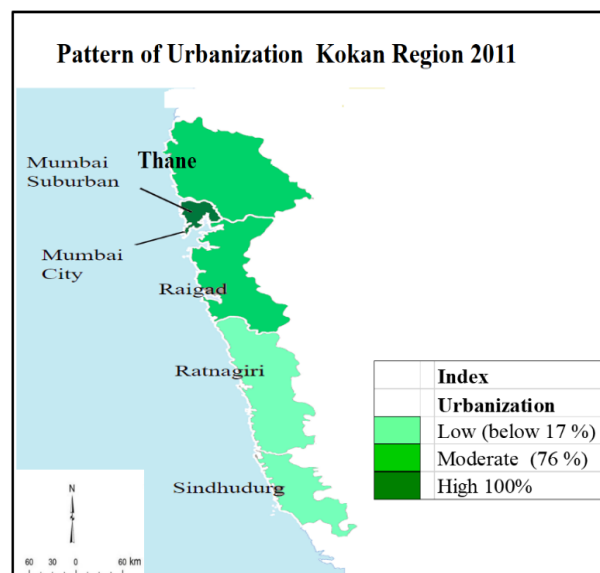


Figure -6 Pattern of Urbanization in Kokan Region: 2011

### Correlation between sex ratio and the Urbanization

The correlation between sex ratio and the urbanization is -0.8, indicating that urbanization and the sex ratio are negatively correlated. Thus, as the urbanization increases the sex ratio decreases automatically.

Formula of the correlation

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

$$= 1 - 6 \cdot 63 / 6(6^2 - 1)$$

$$= -0.8$$

(Table-4)

Sr. No	District	Sex ratio	Rank	Urbanization	Rank	D	D <sup>2</sup>
1	Mumbai (Suburban)	857	5	100.00	1	4	16
2	Mumbai	838	6	100.00	1	5	25
3	Thane	880	4	76.98	2	2	4
4	Raigarh	955	3	36.83	3	0	0
5	Ratnagiri	1123	1	16.32	4	-3	9
6	Sindhudurg	1037	2	12.59	5	-3	9
7		N=6					$\sum D_i^2 = 63$

Figure 7 Pattern of Sex Ratio Kokan Region: 2011

### Special pattern of the sex ratio in Kokan

According to the census 2011, the sex ratio of the Kokan region is 948. If we go through table 4 it is pointed out that the sex ratio of whole Kokan varies from 838 to 1123 from one district to another district. All the districts of

Kokan can be categorized into 3 groups.

**a. Low Sex Ratio**

The districts which have the sex ratio below 957 are included in this category. Mumbai and Mumbai (Suburban) districts have the sex ratio is 857 and 838.

**b. Moderate Sex Ratio**

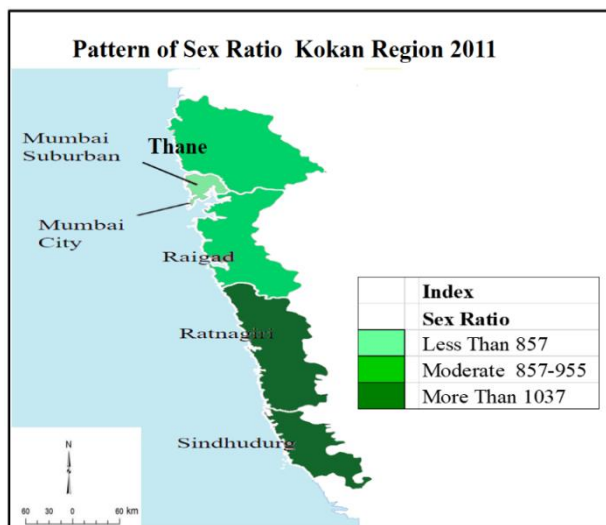
The districts which have the sex ratio between 880-955 are included into this category. Thane and Raigarh have the moderate kind of sex ratio.

**c. High Sex Ratio**

The districts which have the sex ratio above 1123 are included into this category. The high sex ratio has been recorded in the districts of the Ratnagiri and Sindhudurg districts.

Sr. No	Categories	Districts
1.	Low sex ratio	Mumbai, Mumbai (Suburban)
2.	Moderate sex ratio	Thane, Raigarh
3.	High sex ratio	Ratnagiri, Sindhudurg

Source- Census handbook 2011  
(Table -5)



**IMPACT OF THE DECLINING SEX RATIO ON KOKAN 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 and prostitution.
3. It also witnessed in human development report (2018) on gender in equality index that India was placed in the

130<sup>th</sup> rank which depicts the significance of gender discrimination.

**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 1951 to 2011 in the region. But it fluctuating over the decades under the purview of our study. 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 Mumbai and Mumbai (Suburban). There is high sex ratio in the middle districts of Kokan region. The correlation between the sex ratio and the literacy rate is highly positive which signifies that the areas where the sex ratio is high tends to have better education. There is a strong negative correlation between the sex ratio and the urbanization which indicates that if the urbanization will increase the sex ratio will deteriorate and vice versa. However, since correlation is not indicative of causality, we recommend future scholarly efforts to probe the root cause behind this intriguing phenomenon.

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