



## STUDY OF SEX RATIO IN INDIA AND STATE-WISE ANALYSIS

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### ABSTRACT:

*Sex ratio is defined as the number of females per 1000 males in the population and 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. It may be noted that the sex ratio is expected to be almost at parity in nature. According to experts sex differential in mortality, sex selection out-migration, skewed sex ratio at birth are the major contributory factors that influence changes in sex ratio.*

**KEYWORDS:** Sex ratio, OSR, CSR, Fisher's principle.

### 1. INTRODUCTION:

In India, sex ratio is skewed in favour of males and has continued to rise and expand in various forms. This has drawn wide attention of policy makers and planners to reverse the trend to bring it back to parity.

The sex ratio is the ratio of males to females in a population. In most sexually reproducing species, the ratio tends to be 1:1. This tendency is explained by Fisher's principle (Fisher, 1930). For various reasons, however, many species deviate from anything like an even sex ratio, either periodically or permanently. Examples include parthenogenic species, periodically mating organisms such as aphids, some eusocial wasps such as *Polistes fuscatus* and *Polistes exclamans*, bees, ants, and termites.

The human sex ratio is of particular interest to anthropologists and demographers. In human societies, however, sex ratios at birth may be considerably skewed by factors such as the age of mother at birth, and by sex-selective abortion and infanticide. Exposure to pesticides and other environmental contaminants may be a significant contributing factor as well. As of 2014, the global sex ratio at birth is estimated at 107 boys to 100 girls (1000 boys per 934 girls).

In most species, the sex ratio varies according to the age profile of the population.

#### It is generally divided into four subdivisions:

- Primary Sex Ratio: ratio at fertilization.
- Secondary Sex Ratio: ratio at birth.
- Tertiary Sex Ratio: ratio in sexually mature organisms.
- Also called adult sex ratio and abbreviated to ASR. ASR is defined as the proportion of adults in a population that are male.
- Operational sex ratio abbreviated as OSR is the proportion of adults in the sexually active population that are males. 'OSR' has often been confused with 'ASR' although these are conceptually different.

- Quaternary Sex Ratio: ration in post-reproductive organisms.

Measuring these requires sophisticated mathematics since they lack clear boundaries.

The theory of sex ratio is a field of study concerned with the accurate prediction of sex ratios in all sexual species, based on a consideration of their natural history. The field continues to be heavily influenced by Eric Charnov (Charnov, 1982). He defines five major questions, both for his book and the field in general (slightly abbreviated here):

1. For a dioecious species, what is the equilibrium sex ratio maintained by natural selection?
2. For a sequential hermaphrodite, what is the equilibrium sex order and time of sex change?
3. For a simultaneous hermaphrodite, what is the equilibrium allocation of resources to male versus female function in each breeding season?
4. Under what conditions are the various states of hermaphroditism or dioecy evolutionarily stable? When is a mixture of sexual types stable?
5. When does selection favour the ability of an individual to alter its allocation to male versus female function? In response to particular environmental or life history situations?

Biological research mostly concerns itself with sex allocation rather than sex ratio, sex allocation denoting the allocation of energy to either sex. Common research themes are the effects of local mate and resource competition (often abbreviated LMC and LRC, respectively).

Fisher's principle explains why for most species, the sex ratio is approximately 1:1. Will Hamilton (Hamilton, 1967) expounded Fisher's argument as follows, given the assumption of equal parental expenditure on offspring of both sexes.

1. Suppose male births are less common than female.
2. A newborn male then has better mating prospects than a newborn female, and therefore can expect to have more offspring.
3. Therefore parents genetically disposed to produce males tend to have more than average numbers of grandchildren born to them.
4. Therefore the genes for male-producing tendencies spread, and male births become more common.
5. As the 1:1 sex ratio is approached, the advantage associated with producing males dies away.
6. The same reasoning holds if females are substituted for males throughout. Therefore 1:1 is the equilibrium ratio.

In modern language, the 1:1 ratio is the evolutionary stable strategy (ESS). This ratio has been observed in many species, including the bee *Macrotera portalis*. A study performed by B. N. Danforth observed no significant difference in the number of males and females from the 1:1 ratio (Danforth, 1990).

## 2. REVIEW IF RELATED LITERATURE

Sex ratio is used to describe the number of females per 1000 of males. Sex ratio is a valuable source for finding the population of women in India and what is the ratio of women to that of men in India. In the Population Census of 2011 it was revealed that the sex ratio in India is 940 females per 1000 of males. The Sex Ratio 2011 shows an upward trend from the Census 2001 data. Census 2001 revealed that there were 933 females to that of 1000 males. Since decades India has seen a decrease in the sex ratio 2011, but since the last two of the decades there has been in slight increase in the sex ratio (Jha, P., Kumar, R., Vasa, P., Dhingra, N., Thiruchelvam, D. and Moineddin, R., 2006). Since the last five decades the sex ratio has been moving around 930 of females to that of 1000 of males.

The major cause of the decrease of the female birth ratio in India is considered to be the violent treatments meted out to the girl child at the time of the birth. The Sex Ratio in India was almost normal during the phase of the years of independence, but thereafter it started showing gradual signs of decrease. Though the sex ratio in India has gone through commendable signs of improvement in the past 10 years, there are still some states where the sex ratio is still low and is a cause of concern is Haryana. The state of Haryana has the lowest rate of sex ratio in India and the figure shows a number of 877 of females to that of 1000 of males.

There are also states such as Puducherry and Kerala where the number of women is more than the number of men. Kerala houses a number of 1084 females to that of 1000 males. While Puducherry and Kerala are the only two states where the number of female is more than the number of male, there are also states in India like that of Karnataka, Andhra Pradesh and Maharashtra where the sex ratio 2011 is showing considerable signs of improvement. Some facts related to the Sex Ratio in India follows, the main cause of the decline of the sex ratio in India is due to the biased attitude which is meted out to the women. The main cause of this gender bias is inadequate education. Puducherry and Kerala houses the maximum number of female while the regions of Daman and Diu and Haryana have the lowest density of female population.

### 3. OBJECTIVES

- To identify the major Indian States with fluctuations in general as well as child sex ratio.
- To trace the reasons behind such fluctuations.
- To understand the implications of changing sex composition in Indian society.
- To study the dimension of changing sex ratio among the districts of West Bengal.

### 4. METHOD & PROCEDURE:

The study adopted analytical survey method since it aims to compare the sex ratio in India. The data is collected through internet from census reports and various websites of Government of India. The data is analyzed critically with logical approach considering various factors related with sex ratio in India.

### 5. RESULTS & DISCUSSION:

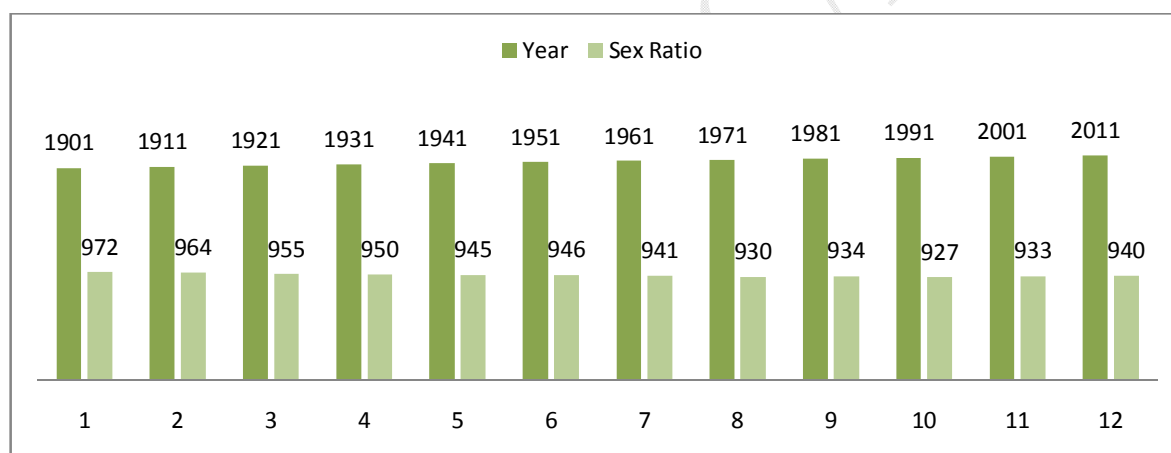
#### 5.1. State-wise data of sex ratio in india as per the census of 2011 in comparison with the census of 2001

Sl.No.	State	Census 2011		Census 2001	
		Sex Ratio	Child Sex Ratio	Sex Ratio	Child Sex Ratio
	<b>India</b>	<b>943</b>	<b>919</b>	<b>933</b>	<b>927</b>
1	Kerala	1084	964	1058	960
2	Puducherry	1037	967	1001	967
3	Tamilnadu	996	943	987	942
4	Andra Pradesh	993	939	978	961
5	Chhattishgarh	991	969	989	975
6	Meghalaya	989	970	972	973
7	Manipur	985	930	974	957
8	Odisha	979	941	972	953
9	Mizoram	976	970	935	964
10	Goa	973	942	961	938
11	Karnataka	973	948	965	946
12	Himachal Pradesh	972	909	968	896
13	Uttarakhanda	963	890	962	908
14	Tripura	960	957	948	966
15	Assam	958	962	935	965
16	West Bengal	950	956	934	960
17	Jharkhanda	948	948	941	965
18	Lakshadweep	946	911	948	959
19	Arunachal Pradesh	938	972	893	964
20	Nagaland	931	943	900	964
21	Madhya Pradesh	931	918	919	932

22	Maharashtra	929	894	922	913
23	Rajasthan	928	888	921	909
24	Gujrat	919	890	920	883
25	Bihar	918	935	919	942
26	Uttar Pradesh	912	902	898	916
27	Punjab	895	846	876	798
28	Sikkim	890	957	875	963
29	Jammu & Kashmir	889	862	892	941
30	Haryana	879	834	861	819
31	Andaman & Nicobar Islands	876	968	846	957
32	Delhi	868	871	821	868
33	Chandigarh	818	880	777	845
34	Dadra & Nagarhaveli	774	926	812	979
35	Daman & Diu	618	904	710	926

### 5.2. Analysis of sex-ratio --- India and states

As per the Census 2011, total population of India is 1,21,01,93,422 which comprises of 62,37,24,248 males and 58,64,69,174 females with the sex ratio of 940 females per 1000 males.  
Sex Ratio of India (1901-2011)



### 5.3. Top five states/uts by sex ratio-2011

Sl.No.	State/UT	Sex Ratio (females per 1000 males)
1	Kerala	1084
2	Puducherry	1038
3	Tamilnadu	995
4	Andhra pradesh	992
5	Chhattishgarh	991

**5.4. Bottom five states/uts by sex ratio-2011**

Sl.No.	State/UT	Sex Ratio (females per 1000 males)
1	Daman and Diu	618
2	Dadra and Nagar Haveli	775
3	Chandigarh	818
4	Nct of Delhi	866
5	Andaman & Nicobar Islands	878

**5.5. Sex ratio of india in comparison of other countries**

Sl.No.	Country	Sex Ratio
	<b>World</b>	<b>984</b>
1	Russian federation	1165
2	France	1056
3	Japan	1054
4	Germany	1038
5	United Kingdom	1037
6	Brazil	1031
7	South Africa	1028
8	United States of America	1026
9	Republic of Korea	1020
10	Australia	1011
11	Ethiopia	1010
12	Indonesia	1003
13	Nigeria	995
14	Malayasia	970
15	Iran	968
<b>16</b>	<b>India*</b>	<b>940</b>
17	China	927
18	Saudi Arab	828

(Source: World Population Prospects (midyear estimates), 2010 revision, Sex and age United Nation)

**5.6. Sex ratio of india in comparison with neighbouring countries**

Sl. No.	Neighbouring country	Sex ratio
1	Mayanmar	1048
2	Srilanka	1032
3	Nepal	1014
4	Bangladesh	978
5	Pakistan	942
6	India	940
7	Afganisthan	931
8	Bhutan	897

**5.7. Child sex ratio (CSR) and overall sex ratio(OSR) in india**

Year	1951	1961	1971	1981	1991	2001	2011
OSR	946	941	930	934	927	933	940
CSR	983	976	964	962	945	927	914

**5.8. Child sex ratio and overall sex ratio in West Bengal**

Year	1951	1961	1971	1981	1991	2001	2011
OSR	865	878	891	911	917	934	947
CSR	----	1008	1010	981	967	960	950

**5.9. Temporal fluctuation of crude sex ratio in west bengal and india (1901-2011)**

Year	Crude Sex Ratio in West Bengal	Crude Sex Ratio in India
1891-1901	945	972
1901-1911	925 (-20)	964 (-08)
1911-1921	905 (-20)	955 (-09)
1921-1931	890 (-15)	950 (-05)
1931-1941	852 (-38)	945 (-05)
1941-1951	865 (+13)	946 (+01)
1951-1961	878 (+13)	941 (-05)
1961-1971	891 (+13)	930 (-11)
1971-1981	911 (+20)	934 (+04)
1981-1991	917 (+06)	927 (-07)
1991-2001	934 (+17)	933 (+05)
2001-2011	947 (+13)	943 (+10)

\*Source: Census of India, 1901-2011.

**5.10. district level trends of sex ratio in west bengal**

Year	1961-1971	1971-1981	1981-1991	1991-2001	2001-2011
Darjeeling	882	888	914	943	970
Jalpaiguri	887	910	927	941	953
Coochbehar	916	935	935	949	942
Uttar Dinajpur	921	937	930	937	939
Dakshin Dinajpur				950	956
Malda	948	949	938	948	944
Murshidabad	956	959	943	952	958
Nadia	948	946	936	947	947
North 24 Parganas	882	903	907	927	955
South 24 Parganas	882	903	927	938	956
Howrah	833	873	818	906	939
Hooghly	896	909	917	947	961
Bardhaman	886	897	899	921	945
Birbhum	978	968	946	949	956
Bankura	958	964	951	953	957
East Midnapore	945	951	944	955	938
West Midnapore					966
Purulia	963	957	947	953	957

\*Source: Census of India, West Bengal Series (1971-2011).



### 5.11. Spatial pattern of sex ratio of west bengal, 2011

Categories	Districts
High Sex Ratio (Above 950 females per 1000 males.)	Birbhum; Bankura; West Midnapur; Hooghly; North 24 Parganas; North 24 Parganas ;Murshidabad; Dakshin Dinajpur; Jalpaiguri; Darjeeling; Purulia.
Moderate Sex Ratio ( 900 to 950 females per 1000 males).	Bardhaman; East Midnapur; Howrah; Nadia; Uttar Dinajpur; Malda; Coochbehar.
Low Sex Ratio (Below 900)	Kolkata

## 6. ANALYSIS AND CONCLUSION:

The measurement of Sex Ratio is one of the vital demographic attributes for any country. It is defined as the ratio of females per 1000 male population. The sex ratio at birth may be skewed by factors such as the age of mother, sex selective abortion which is commonly known as female foeticide as well as incidences of female infanticides (Ramaiah, G.J., Chandrasekarayya, T. and Murthy, P.V., 2011). Despite being one of the fastest growing economies in the world, India is still grappled with the declining child sex ratio.

In West Bengal, the general sex ratio has somewhat improved while the child sex ratio has declined. In majority of the districts child sex ratio has drastically declined. General as well as child sex ratio have been found to be favourable among tribal population in comparison to that of scheduled caste and general caste population. The mean age of marriage for the State has somewhat improved both for the rural and urban areas.

The declining sex ratio is actually an undeclared emergency crisis which has its profound and frightening implications upon society and future of mankind. It is shocking that killing of the girl child both before and after birth is still practiced in the country despite legal prohibitions and incentive-based schemes provided by the State and Union Governments. Rural society in the country is still entangled in class and caste divide with a deliberate intention that a girl child should not be born. This artificial alteration of demographic structure has implications not only on gender justice but also on the pattern of social violence and human development. Gender equality is still eluding in India. Restoration of the gender balance is not only the sole duty of the Government but its responsibility is bestowed on Non-government Organisations also for championing the campaign for mass awareness. "Beti Bachao, Beti Padoo" or "Save and Educate the Girl Child" has to be the motto of every Indian family now-a-days. Empowerment of women in the field of socio-economic and political arena should be the essence of modern Indian society and then only a balanced demographic structure within the country could be achieved.

In 2015, the sex ratio in India was 943 females per 1000 males. Sex ratio varies from region to region. In the latest census, Kerala has 1084 females per 1000 males, making it the best state to have a good sex ratio. With a ratio of 877 females per 1000 males, the state of Haryana suffers from the lowest sex ratio. There has been a great improvement in the sex ratio of India. In 2012, India had a ratio of 940 females per 1000 males (Chakraborty, L.S. and Sinha, D. 2006).

India has the largest population of children with 400 million. One out of the sixth girl child dies due to female foeticide. 75% of the married women in India were underage during the time of their marriage. Kerala has the highest sex ratio. In union territories, Daman & Diu has the lowest sex ratio whereas Puduchery has the highest sex ratio.

### FACTORS RESPONSIBLE FOR DECLINING SEX RATIO:

- ❖ **Education:** The role of education has a great influence on the sex ratio scenario of India. Child marriages are a common part of the Indian society. Most of the girls are prone to the issue of child marriage at a very early age. These make them to stay away from the education and are compelled to take the responsibilities of the household. Due to illiteracy, people are unaware about the power and role of women in today's society.

- ❖ **Poverty:** Poverty is one of the factors which are responsible for the declining sex ratio. States like Taminadu have a high sex ratio but the poverty rate is low. There are states wherein due to poverty, a lot of girls are denied of nutritious food. This deprives the women and girl child from living a healthy life.
- ❖ **Lack of empowerment of women:** There is a lack of empowerment of women especially in the rural areas. Women do not enjoy opportunities as men do. Due to lack of education, women are unable to establish their roles in many places. The state of Uttar Pradesh has become like a grave for girls.
- ❖ **Male domination:** Majority of the places in India follow the patriarchal system. In India, males are considered to be the only bread earners. The methods of sex determination and female foeticide are adopted which is main reason of declining number of females especially in North India.
- ❖ **Infant and maternal mortality:** Infant mortality rate is the number of death of babies before the age of one. Due to female foeticide, the sex ratio declines terribly. Maternal mortality also contributes to the declining sex ratio as most of the women die during the childbirth due to improper care and less facilities.

### SCHEMES TO COMBAT THE PROBLEM OF SEX RATIO:

Due to the declining sex ratio, the governments have introduced certain schemes to combat the problem:

- ❖ **Beti bachao, beti padhao:** This is one of the important campaigns introduced by the government led by Narendra Modi to generate awareness and improve the efficiency of the welfare services meant for women. The initiative was launched by the Prime Minister Narendra Modi on 22 January 2015 in Haryana.
- ❖ **Sukanya samridhi account:** This scheme has been notified by the Ministry of Finance on 2 December, 2014. The initiative aims at opening a new account for the girl child. The account can be operated by her after the age of ten. The account can be opened in a post office or a public sector bank.
- ❖ **The girl child protection scheme:** The scheme is aimed at preventing the gender discrimination by protecting the rights of the girl child. It also tries to eliminate the negative attitudes and practices against the girl child.
- ❖ **PCPNDT Act:** The Indian government has passed the 'Pre-Conception and Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act or in short PCPNDT Act in 2004 to ban and punish prenatal sex screening and female foeticide. It is currently illegal in India to determine or disclose sex of the foetus to anyone. However, there are concerns that PCPNDT Act has been poorly enforced by authorities.
- ❖ **Kanyashree (West Bengal):** This is one of the important campaigns in the promotions of girl child by the Government of West Bengal led by Mamata Banerjee to promote the education of girl child by providing financial supports.
- ❖ **Rupashree (West Bengal):** Recently Mamata Banerjee led government has announced this scheme in West Bengal to prevent child marriage and education.

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