

An Evaluation of Associated Factors Affecting Variations in Sex Ratio in Andhra Pradesh, Based on Data 2001

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Abstract

The sex ratio was found lower in Andhra Pradesh with a downward trend over years. Most of the Indian states were observed with a lowered sex ratio. Kerala was the only state with sex ratio comparable to some developed countries. The sex ratio in Andhra Pradesh was same as those observed in developed countries at birth it declined with age later and was substantially lower than those observed in developed countries at all ages. Differentials of mortality, fertility and literacy rates and indicators of health and nutritional status and socio-economic status were well correlated with variations in sex ratio at national and international level. Results of analysis of data by regions in the state were variation of order of occurrence of indicators explaining the variations in sex ratio of all the regions in Andhra Pradesh. Rayalaseema was sex ratio with poorer grades of development than the regions of Telangana and Coastal Andhra. In Coastal Andhra and Telangana region also, some of the districts were sex ratio with poorer status of social and economic development.

Key words: *Research, sex ratio, associated factors, regions of Andhra Pradesh, based on data 2001, Statistical models.*

INTRODUCTION

Sex ratio which was defined as the ratio of females per 1000 males has been found higher in the developed countries and lower in developing countries like India and most of the Indian states. The ratio was found to decline in Andhra Pradesh over decades. Variations in sex ratio between regions in Andhra Pradesh and between states of India or between countries are due to variations in mortality rates, fertility rates, health and nutritional status, socio-economic status, available resources and their utilization and health and educational facilities. Attempts have been very few to trace the combinations of factors which are associated with variations in sex ratio. An attempt was therefore made to trace the best of factors associated with variations in sex ratios in states (selected) of India and developing countries and Andhra Pradesh by regions.

In an article in 1980, Amartya Sen indicated that worldwide, particularly in Asia, millions of women were missing from the population totals of many countries. He also noted the ‘alarming fact’ that the sex ratio for females children in China, India and South Korea is actually deteriorating, while the overall sex ratio for females in those countries has marginally improved. Sen argued that the number of women missing in any population could be estimated by calculating the numbers of extra women who would have survived in that society. This would have been so if it had the same ratio of women and men as in other regions of the world where both sexes receive similar care. Given the low ratio of 0.94 women to men in South Asia, West Asia and China indicating a deficit of 6 percent, he concluded that since in countries where women and men receive similar care, the ratio is about 1.05, and the real deficit is about 11 percent of their women. These numbers tell “Malnutrition of Rural Children and Sex Bias” [7]. In most of the Indian states, the widening gap in the ratio of girls to boys is clearly brought to light in the Census of 2001. It confirms a trend that has been in place since 1901. This is most pronounced in the youngest age group 0-6, indicating the scale of injustice as well as the long-term social and economic consequences implied.

The high masculine sex ratios of the Andhra Pradesh population had been a matter of concern for many decades. Considerable attentions have been made to different dimensions of female deficits in Andhra Pradesh and

persisting regional variations since the numerical imbalances between the male and female sexes were pointed out in the seventies. The results of 2001 census have set off a further debate on the issue and have narrowed down the focus to the changes in the juvenile or child sex ratio. Changes in the sex ratio of children, aged 0-6 years, better indicator of status of girl child in Andhra Pradesh environment known to be more hostile to female in their early ages. It also reflects the sum total of intra household's gender relations.

Objectives of the study

1. To study trends of change in sex ratio in Andhra Pradesh by regions (area wise)
2. To study trends of change in sex ratio in Andhra Pradesh by regions in comparison with those of Kerala, UP & India.
3. To trace districts having the highest and lowest sex ratio in each of the regions in Andhra Pradesh
4. To trace districts by region with sex ratio above and below the sex ratio of Andhra Pradesh.
5. To trace the districts having sex ratio lower and higher than that of the possible normal values of Andhra Pradesh.
6. To trace the best set of socio-economic, demographic, agro-economic, transport and communication factors associated with variations in sex ratio in Andhra Pradesh by regions.
7. To study how the regions of Andhra Pradesh are, compared to other parts of India and developed countries in the world.

It also attempted to trace the differentials, if any, between regions of Andhra Pradesh with socio-economic, demographic, agro-economic, transport and communication factors. The data available for Andhra Pradesh has been compiled over years and utilized for inference.

The work with these objectives will help us to trace the factors associated with variations in sex ratio and it will also help us to know how Andhra Pradesh compared to the developing and developed parts of India and the world.

MATERIALS AND METHODS

Data available on sex ratio over decades and latest based on 2001 available by age in Andhra Pradesh by regions and some states and also some countries, were compiled from the national and international publications. Indicators of Socio-economic, demographic, health and nutritional status and some agro-economic status are chosen for assessing their association with sex ratio. They were compiled for available regions of Andhra Pradesh, India and the world.

All the indicators were compared between regions of Andhra Pradesh. Statistical methods utilized in the study are (i) calculation of mean values (ii) comparisons of measures of averages (iii) calculation of correlation coefficients and multiple correlation coefficients (iv) multiple regression procedures (v) Tests of significance and (vi) development suitable models with the use of methods of least squares [3].

Best set of indicators related to sex ratio was arrived at with the (a) calculation of correlation coefficients with sex ratio and (b) utilizing of step-wise multiple regression and discrimination procedures (Biostatistics, 1996). Indicators correlated with sex ratio were chosen. Best set of indicators correlated with sex ratio were chosen with use of step-wise multiple regression and discriminant analysis. In the development and utilization of procedures in tracing the variations associated with sex ratio, multiple correlation coefficients (R), Mahalanobis (D^2), Wilks Lambda (Λ) and Variance ratio (F) test were utilized.

Correlations were tested with the use of appropriate tests of 't' or 'Z' test or AN OVA with multiple comparison test procedures. [2] & [5].

Needful appropriate transformation procedures and multiple comparison methods with ANOVA were also utilized for tracing the differentials of variations between regions under study [10].

Computer software procedures utilized were Statistical Package for Social Science (SPSS) programmes.

RESULTS AND DISCUSSIONS

Andhra Pradesh is one of the major states in India and ranks fifth in terms of population. The population of the state was about 75.7 million in 2001 (Census 2001) in terms of population the state is bigger than many countries in the world. Its geographical spread of 274.4 lakh hectares accounting for 8.37 percent of the total area of the country makes it the fourth largest state in the country. The state capital Hyderabad has

become an A1 city in 200 with 54 lakh population. There are 23 districts and 1099 mandals in the state. The projected population would be around 83 million in March 2007 accounting for 7.4 percent of country's population. Andhra Pradesh has three regions which are district in terms of socio-economic characteristics owing to historical reasons and region wise variation, resource availability and utilisation. Of all the 23 districts, ten are in Telangana, nine are in Coastal Andhra and four are in Rayalaseema.

Table 1. Trends in sex ratio of Andhra Pradesh by regions: 1901-2001

Regions	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
Telangana	948	958	964	954	959	983	976	969	972	969	974
Coastal Andhra	1020	1030	1030	1021	1007	1003	997	993	988	985	990
Rayalaseema	968	966	958	959	955	957	959	959	958	955	970
Andhra Pradesh	985	992	993	987	980	986	981	977	975	972	978

Note: data from Census 1901-2001

From table 1, sex ratio in Andhra Pradesh was found to have a downward trend from 1901-2001. Declining trend was observed both in rural and urban areas of Andhra Pradesh during the period of 1961-2001. Regarding the sex ratio, it is observed that Rayalaseema was with a move towards higher decline compared to other regions. Sex ratio region wise in Andhra Pradesh is also compared with some selected states in India.

Indicators significantly correlated with overall sex ratio in Andhra Pradesh by regions:

- In Telangana region, literacy (male and female) indicators, socio-economic indicators, economic indicators that are work participation rate female and per capita income are significantly correlated with overall sex ratio.
- In Coastal Andhra region, child health indicators, IMR, literacy (male) indicators and per capita income are significantly correlated with overall sex ratio.
- In Rayalaseema region, child health indicators, literacy (male and female) level and socio-economic indicators are significantly correlated with overall sex ratio.
- In overall Andhra Pradesh, percentage of women representatives in elections, literacy (male and female) levels, demographic indicators, health facility indicators, economic (work participation rate - male) indicator and per capita income are significantly correlated with overall sex ratio.

Likewise we did indicators significantly correlated with sex ratio by age group wise that are (0-4) years, (5-9) years, (10-14) years, (15-19) years, (20-24) years and (25-29) years in Andhra Pradesh by regions.

Table 2. Standardized partial regression coefficient approach for order of occurrence of indicators in Telangana

S.No	Indicators	Rank
1	% women representative in local bodies in the recent elections (1.12)	1
2	Gross irrigated area (1.12)	2
3	Work participation rate female (0.92)	3
4	Per capita income, 2006-2007 (0.89)	4
5	All doctors available per lakh population (0.53)	5
6	Work participation rate – male (0.24)	6
7	No.of bank (commercial) branches available per lakh population (0.22)	7
8	Population density (0.22)	8

Table 3. Standardized partial regression coefficient approach for order of occurrence of indicators in Coastal

S.No	Indicators	Rank
1	Work participation rate male (0.90)	1
2	No.of bank (commercial) branches available per lakh population (0.85)	2
3	Per capita income, 2006-2007 (0.74)	3
4	% women representitative in local bodies in the recent elections (0.53)	4
5	Gross irrigated area (0.48)	5
6	Work participation rate – female (0.44)	6
7	All doctors available per lakh population (0.17)	7
8	Population density (0.09)	8

Cont....

Table 4. Standardized partial regression coefficient approach for order of occurrence of indicators in

S.No	Indicators	Rank
1	Per capita income, 2006-2007 (0.83)	1
2	Work participation rate male (0.67)	2
3	All doctors available per lakh population (0.37)	3
4	Work participation rate – female (0.34)	4
5	Gross irrigated area (0.32)	5
6	No.of bank (commercial) branches available per lakh population (0.29)	6
7	% women representitative in local bodies in the recent elections (0.11)	7
8	Population density (0.04)	8

Table 5. Standardized partial regression coefficient approach for order of occurrence of indicators in overall Andhra Pradesh

S.No	Indicators	Rank
1	% women representitative in local bodies in the recent elections (0.62)	1
2	Gross irrigated area (0.43)	2
3	Per capita income, 2006-2007 (0.27)	3
4	Work participation rate – female (0.16)	4
5	Work participation rate male (0.11)	5
6	All doctors available per lakh population (0.04)	6
7	No.of bank (commercial) branches available per lakh population (0.02)	7
8	Population density (0.02)	8

Variables which are significantly related to the dependant variable sex ratio. Deferentions are provided for Andhra Pradesh regions wise in table 2 to table 5. Order of importance of indicators by region is varying. Standardized partial regression coefficient approach was utilized [3].

Indicators those are different between regions of Telangana & Coastal Andhra:

- Women representitative in election, violence rate, economic indicators (work participate rate - male) and fertility rate indicators are significantly ($F_{0.05 (1, 17)} = 4.45$, $F_{0.01 (1, 17)} = 8.40$, $F_{0.05 (1, 16)} = 4.49$ & $F_{0.01 (1, 16)} = 8.53$) different between Telangana & Coastal Andhra.
- In Telangana region Hyderabad district is completely urbanized.

Indicators those are different between regions of Coastal Andhra & Rayalaseema:

- Women representitative in election, demographic indicators, and gross irrigated area are significantly ($F_{0.05 (1, 12)} = 4.75$, $F_{0.01 (1, 12)} = 9.33$) different between Coastal Andhra & Rayalaseema.

Indicators those are different between regions of Telangana & Rayalaseema:

- Violence rate, economic indicators that is work participated rate – male and child development indicators are significantly ($F_{0.05(1,12)} = 4.75$, $F_{0.01(1,12)} = 9.33$, $F_{0.05(1,11)} = 4.84$ & $F_{0.01(1,11)} = 9.65$) different between Telangana & Rayalaseema.
- In Telangana region Hyderabad district is completely urbanized.

Table 6. Best set of indicators different between regions of Andhra Pradesh

Region	Indicators	D ²	^	F Ratio	d.f	Sig.
Telangana	Work participation rate - male	5.943	0.374	26.742	1,16	0.00
	Beds available per lakh population	11.430	0.237	24.110	2,15	0.00
Coastal Andhra	Population Density	2.813	0.585	7.790	1,11	0.018
Rayalaseema	Violence rate (per lakh population)	6.209	0.390	17.193	1,11	0.002
	Work participation rate - male	16.121	0.198	20.292	2,10	0.000

From table 6, best set of indicators traced using the step wise discriminant methods are as below.

Between Telangana & Coastal Andhra: 1. Economic indicators & 2. Health facility indicators

Between Coastal Andhra & Rayalaseema: Demographic indicators

Between Telangana & Rayalaseema: 1. Violence rate & 2. Economic indicators

- In overall Andhra Pradesh, Coastal Andhra region followed by Telangana region are in the process with developmental improvements.
- Rayalaseema is observed to have a lowered status needing massive developmental improvement.
- Poor sex ratio is observed with high quantum of toddler female mortality and high female mortality during the age of 15-35 years.
- Longevity is to be improved.
- The needful indicators are healthy facility, pattern of irrigation, improvement in social status and transport and communication.

CONCLUSIONS

Variations in sex ratio correlated with variations in fertility and mortality rates, health facility, male-female literacy levels, demographic indicators, socio-economic indicators, economic indicators, per capita income and percentage of women representatives in election were assessed with correlation coefficients and ANOVA. Analysis did for Andhra Pradesh by region wise.

Indicators of mortality, health, socio-economic, economic status, literacy level, demographic and per capita income were well correlated with variations in sex ratio. Available health facilities, child care, female – male literacy rates and per capita income were found to have higher correlations with sex ratio followed by fertility and mortality indicators. Data at region level and state Andhra Pradesh level showed similar relationships with sex ratio. Pregnancy wastage and fertility rates were positively correlated with sex ratio and were high in countries like India.

Best set of indicators correlated with sex ratio arrived at by step wise discriminant function analysis were economic, health and demographic indicators.

Indicators literacy male & female levels, per capita income, hospital facilities, socio-economic status and percentage of women representative in election were also found well correlated with sex ratio. All the indicators were well correlated and the order of importance was economic indicators, followed by health and nutrition, fertility and mortality indicators and resource utilization. Proportions of variations explained region wise at state and international level by sets of indicators are studied.

The major improvements needed for the improvement of sex ratio in India are the improvements in the female and male literacy rates, health and transport facilities and percapita disposable income.

Since these factors are well correlated with nutrient intakes and better life styles, improvement in the above set of indicators automatically reduce fertility and mortality and improve female health leading to higher sex ratios. Countries or Indian states with better female-male literacy rates, per capita income and transport and health facilities were found with better demographic and nutritional status. Variations in sex ratios are seen to indicate the variations in the degree of economic, social, health and nutritional improvements, the communities have.

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