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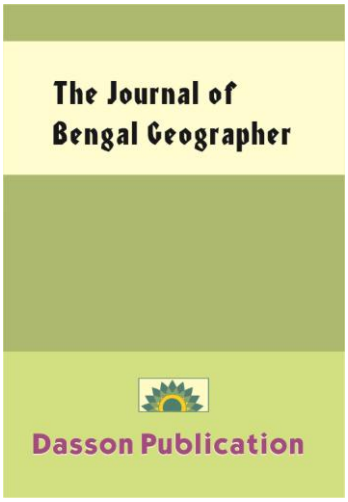

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Mapping sex composition of Indian metropolises

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Abstract

The present work of sex composition has examined in geographic perspective metropolises in India that constitute an important component of Indian urban system. The main point of inquiry is to analysis the change and regional variation of sex composition of metropolises. There are fifty two metropolises in India as per final totals of census 2011. The study follows a systematic approach. In order to find out the results, census data has been used from 1901-2011. The existing sex ratio in the country is basically the product of differential in mortality at various stages of life. In urban areas highly urbanized and industrialized places mainly have low sex ratio due to male selective in migration to such areas. Metropolises located in south India are marked with a relatively more favourable sex ratio as compared to north and north-west states. It is observed that sex ratio in cities with million plus population is high where the urban and rural sex ratio of the state is high. It is noticed that sex ratio in the age group 0-6 has declined by (- 2) point in metropolises in the last decade. The decline in child sex ratio has been equally common in rural as well as urban areas, although the magnitude is evidently on the higher in the rural areas in the 2001-11.The declining child sex ratio is a pan Indian phenomenon, as it will lead to serious demographic imbalances and adverse social consequences.

Key words: *1.Census, 2.Child sex ratio, 3.Metropolis, 4. Sex composition.*

Introduction

Sex composition of a population refers to the balance between male and female in any population. It is an important indicator which determines the role and status of women, the type of marriages, age at marriage, rate of male and female participation at work, the type and stage of development of economy etc. Sex composition in a population would both define the relative quality of life and denote the value placed by society on the sexes (Momsen and Townsend, 1987). Sex ratio is the most commonly used measure to represent sex composition of a population. It can be examined with reference to its three different types viz. primary, secondary and tertiary sex ratio. Primary sex ratio refers to ratio between male and female at the time of conception. Secondary sex ratio denotes the ratio between two sexes at a time of birth, which is generally in favour of males due to biological reasons. Tertiary sex ratio refers to the ratio of the two sexes in the population at the time of enumeration. The present study is based on the tertiary sex ratio based on census data from 1901-2011.

In Indian context, sex ratio is defined in terms of number of females per thousand males. Favourable sex ratio (more than 1000) indicates that female survival is not hampered and the conditions are conducive for the overall growth and longevity of the girl child leading to women hood. At the same time, significant variations in sex ratio at birth point to the interplay of social, cultural and economic factors in gender preferences (UNFPA, 2007). Unlike western countries, Indian urban places, which are the scenes of male excessive in migration, are characterized by a paucity of females (Krishan and Chandna, 1973). David (1951) also agreed with the point that the Indian cities have probably the most distorted sex ratio of any large group of cities in the world. The existing sex ratio in the country is basically the product of differential in mortality at various

stages of life. New agricultural frontiers, highly urbanized and industrialized places mainly have low sex ratio due to male selective in migration to such areas (Singh, 1992 and Gosal, 2001). The importance of operative factors may have changed over a period of time. Of recent sex imbalances are also attributed to sex selection, which is most prevalent in urban areas amongst higher economic quintiles, and even for these groups the practice continues to be fuelled by a patriarchal structure that believes in, values and promotes son preference (UNFPA, 2007).

Urban scene of sex composition in 2001-2011

As per Census 2011, the sex ratio stands at 943 for the country as a whole. This is an improvement from the 2001 Census, which had recorded 933 females for every 1000 males. Sex ratio has increased 29 points in last decade from 900 to 929 in India as a whole in urban area whereas there is only 3 point increased in rural areas. Urban sex ratio has increased in all the states of India ranging from 14 points in Tripura to 78 points in Sikkim. It is decreased only in Daman & Diu and Dadra & Nagar Haveli union territories. North-eastern states have an improved sex ratio in their urban areas. Six states and two union territories have increased more than 50 points in their sex ratio, which include Sikkim, Nagaland, Arunachal Pradesh, Assam, Mizoram and Himachal Pradesh, Delhi and Andaman & Nicobar Islands. Sex ratio has also increased in north western states like Punjab and Haryana where sex ratio is largely unfavourable to females.

At 914 the child sex ratio in the country has reached an all time low since 1961. The fall has been 8 points (927-919) for the country during 2001-2011. Whereas the general sex ratio in urban area has increased to favour of females, it has drastically decreased in 0-6 population in the seventeen states and two union territories and improved only in eleven states and five union territories. One most striking feature which emerged from the current census is that Punjab, Haryana, Himachal Pradesh and Chandigarh have improved the child sex ratio which was very skewed in the last decade. Child sex ratio has decreased marginally from (-) 1 point in West Bengal, Tripura and Chhattisgarh to - 50 points in Daman & Diu. It has substantially declined in Jammu Kashmir, Arunachal Pradesh, Jharkhand, Orrisa and Andhra Pradesh. In rural areas, the fall is significant - 11 points (934-923) and in urban areas it is only - 1 point (906-905) over the decade of 2001-2011. Haryana (832) has recorded the lowest and Puducherry (975) noticed the highest child sex ratio in urban areas (Census, 2011). The declining child sex ratio is a pan Indian phenomenon.

Trend in sex ratio in india and metropolises: 1901-2011

Census data reveals that the sex ratio in the country had always remained unfavourable to females. The sex ratio at the beginning of 20th century in metropolises was 798 that had declined to 705 in 1941 which was the nadir during more than a century (1901-2011). The sex ratio after there it has continued to increase albeit slowly from 763 in 1951 to 917 in 2011. In the 21st century it has continuously increased by 41 points in metropolises and 10 points in the country as a whole during 2001-11. 52 metropolises added more females as compared to males in 2011 census which is a healthy sign. In fact since 1961 census, the sex ratio in urban areas has risen continuously from 845 to 929 in 2011. By contrast rural sex ratio increased only three points. There is ample literature suggest that to male migration was dominated in the metropolises has been partially changed family and female migration after the liberalisation period due to availability of greater job opportunities. In fact, female percentage has increased continuously after independence from 43.3 percent in 1951 to 47.7 in 2011 census.

Table 1 sex ratio: all india and metropolises, 1901 – 2011

Census Years	Sex Ratio			
	Metropolises	Urban Areas	Rural Areas	All India
1901	798	910	979	972
1911	746	872	975	964
1921	712	846	970	955
1931	715	838	966	950
1941	705	831	965	945
1951	763	860	965	946
1961	779	845	963	941
1971	808	858	949	930
1981	845	879	951	934
1991	870	894	938	927
2001	876	900	946	933
2011	917	929	949	943

Source: 1. Computed from Census of India, 1991. Part-II A (ii) – Towns and Urban Agglomerations classified by population in 1991 with variation since 1901.

2. Selected Socio-Economic Statistics India, 2011, Ministry of Statistics and Programme Implementation, Central Statistics Office, Social Statistics Division, New Delhi.

3. Census of India 2011, Final Population Totals, Registrar General of India, New Delhi.

Pattern and change in general sex ratio in metropolises: 2001-2011

The diversity in sex ratio among the metropolises is phenomenal. The change in sex ratio over time is dependent on the changes in the ratios of the individual metropolises. Census 2011 result shows that the sex ratio among metropolises ranged from 1173 in Kannur (Kerala) to 753 in Surat (Gujarat). The metropolises in Kerala and Tiruchirappalli in Tamil Nadu display sex ratio completely in favour of females.

There exist considerable regional variations in the magnitude of deficit of females across metropolises. Metropolises located in south India namely Kerala, Tamil Nadu, Karnataka and Andhra Pradesh are marked with a relatively more favourable sex ratio. As against this, Jammu Kashmir to Bihar and western state including all metropolises report a much more adverse sex ratio. It is observed that sex ratio in cities with million plus population is high where the urban and rural sex ratio of the state is high. Relatively speaking, southern metropolises sex ratio is more favourable to females in comparison to northern states.

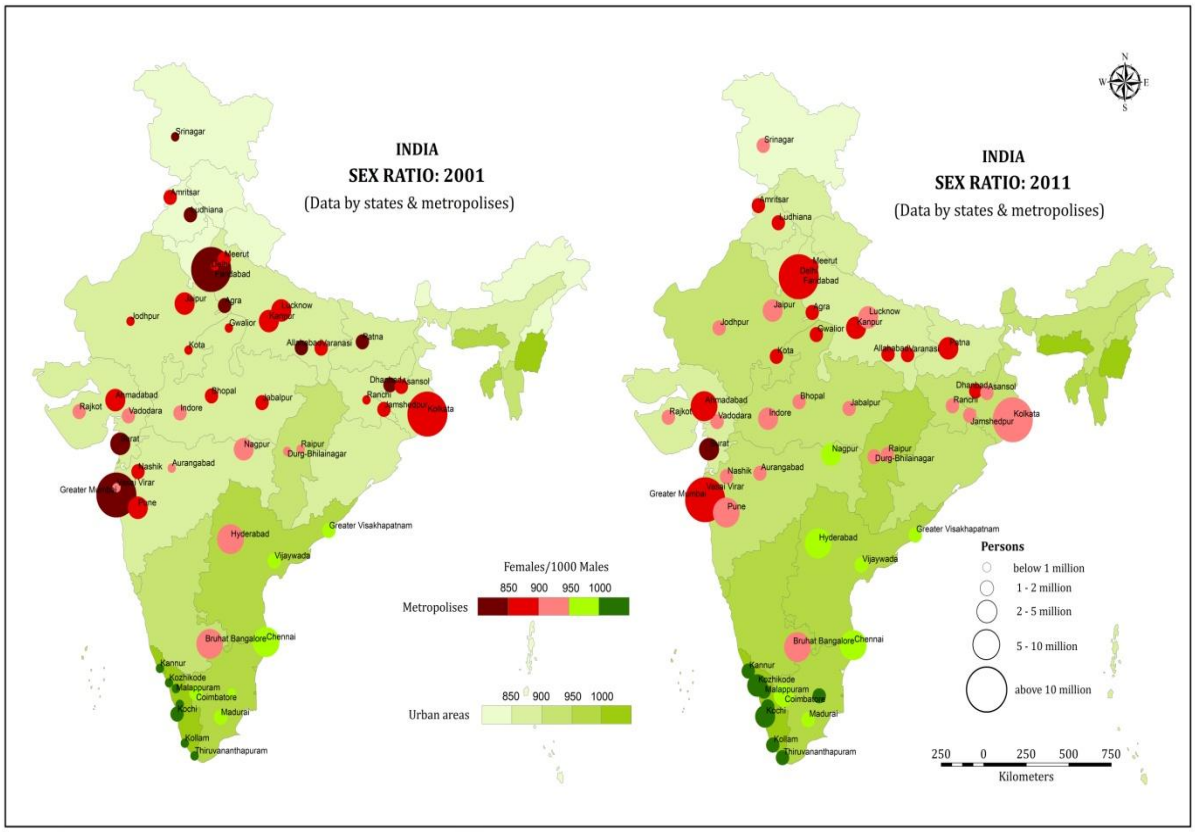

Fig. 1 Pattern of sex ratio in metropolises and urban areas, 2001-2011.

The spatial pattern in the sex composition in metropolises has undergone a remarkable change. The change has been particularly more prominent during the 2001 to 2011. The sex ratio of the total population has shown improvements in as many as forty nine metropolises. It has highest increased by 87 points in Ludhiana to 4 points in Kanpur metropolises. 21 metropolises depict improved sex ratio of more than 40 points in 2011. These are mainly located around Delhi, Kolkata and Mumbai mega cities. In the south, it is more prominent in Kerala and Tamil Nadu metropolises. In Madhya Pradesh all metropolises improved their sex ratio between 1 to 20 points. Nagpur, Raipur and Durag-Bhilainagar metropolises which are located in the central part of India improved by more than 20 points sex ratio in their population. However, during the corresponding period the sex ratio has declined in only three metropolises; Vasai-Vivar (-30), Surat (-7) and Rajkot (-1). In fact the proportion of female population has increased in the last decade in the metropolises leading to improvement the overall sex ratio of the metropolises. The pattern of sex ratio in class-I cities is distinct by population size (Table 2). Indian mega cities have recorded the lowest sex ratio. It is more favourable in cities with less than one million population. In the series of 5-10 million population, Chennai, Bangalore, Hyderabad, Pune and Nashik fall in the category which are mostly located in the south India and have sex ratio in favour to females.

Table 2: sex ratio in class-I CITIES, 2011

Cities population	No. of Cities	General Sex Ratio	Child Sex Ratio
More than 10 million	3	885	904
5-10 million	5	937	915
2-5 million	11	905	882
1-2 million	33	944	899
Metropolises	**52**	**917**	**901**

0.5 million to 1 million	44	925	907
1 lakh to 5 lakh	372	942	903
Class-I Cities	**468**	**937**	**905**
Urban India		**929**	**901**

Source: Computed from Census of India, Final Population Totals, 2011, Registrar General of India, New Delhi.

Pattern and change in child sex ratio in metropolises: 2001-2011

Sex ratio in the age group 0-6 years depends primarily on sex ratio at birth and sex differential in mortality of infant and children (Premi, 2001). The child sex ratio in the metropolises which was 903 in 2001 has decreased 2 points point i.e. 901 in 2011. Among the metropolises child sex ratio ranged from 974 in Kannur (Kerala) to 809 in Surat (Gujarat). In half of the metropolises the sex ratio is lower than 900.

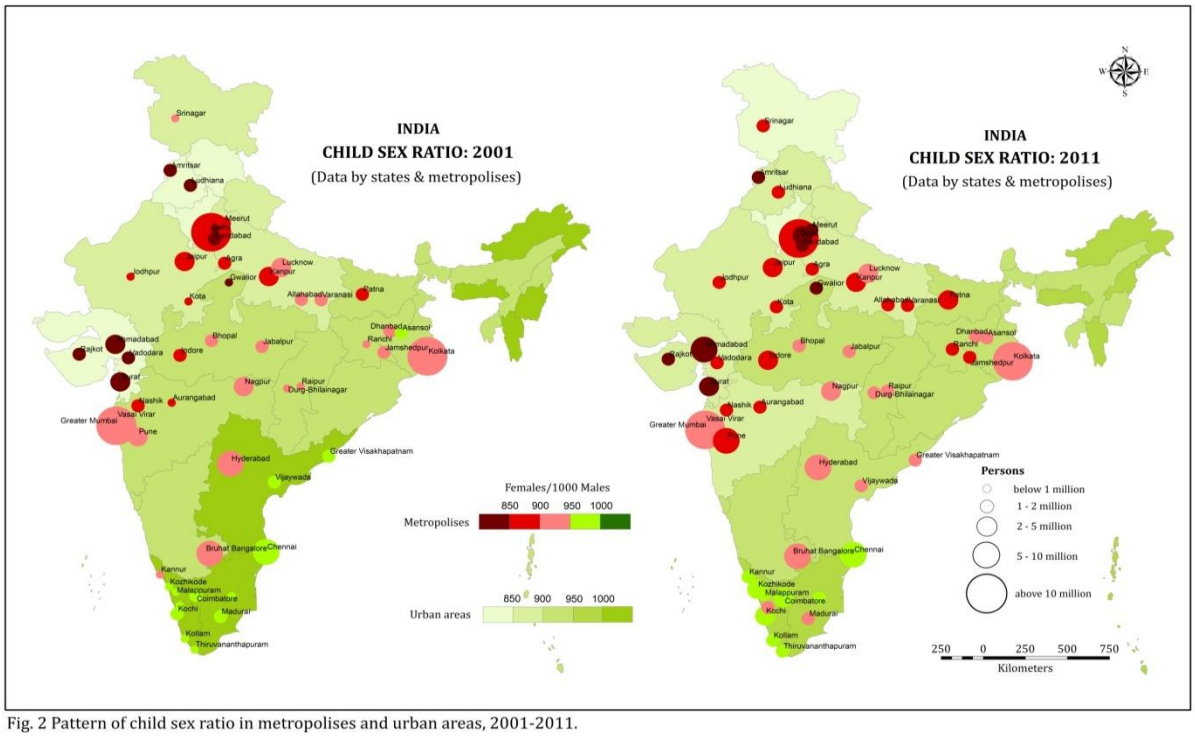

Fig. 2 Pattern of child sex ratio in metropolises and urban areas, 2001-2011.

An examination of the regional pattern of child sex ratio shows variations in the magnitude of the deficit of girl child across metropolises. The metropolises located in south India area namely Kerala, Tamil Nadu, Karnataka and Andhra Pradesh are distinct with a relatively more favourable sex ratio. Similar picture is obtained in the eastern part of the country such as in West Bengal, in the central part of Madhya Pradesh and Chhattisgarh where child sex ratio was more than 900. Except above, the cities of Greater Mumbai and Lucknow has also recorded sex ratio more than 900 in 2011 census. On the other hand, metropolises located in the north and north-west part including Jammu & Kashmir, Rajasthan, Punjab, Haryana, Chandigarh, Delhi, Maharashtra and Gujarat report a much more adverse child sex ratio. Uttar Pradesh and Bihar metropolises also record sex ratio below 900. The largest deficit of girl child is seen around Delhi in Ghaziabad, Meerut, Agra and Faridabad metropolises. The same situation is reflected Surat, Rajkot and Amritsar. The sex ratio in cities with million plus population is high where the urban and rural sex ratio of the state is high. Relatively it is more favourable in metropolises located in south in comparison to north India.

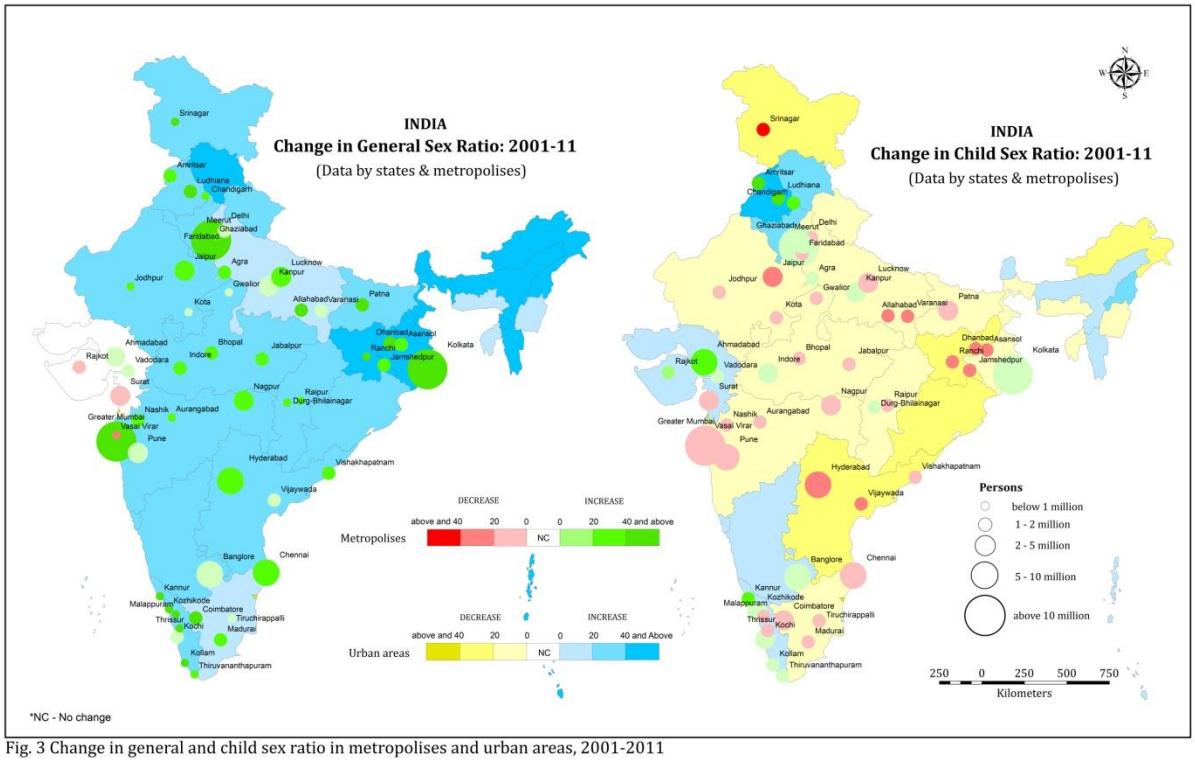

Fig. 3 Change in general and child sex ratio in metropolises and urban areas, 2001-2011

It is clear that the sex ratio in the age group 0-6 has decreased at a much faster pace in the metropolises in 2001-2011. It is more reflective when we see the individual figures of metropolises. The decreasing sex ratio in the child population perhaps has a cascading effect on population over a period of time leading to diminishing sex ratio in the country. It is clear that the imbalance that has set in at this early age-group is difficult to be removed and would remain to haunt the population for a long time to come (Census, 2001). Demographically, the sex ratio of 901 in 2011 of the population in the age group 0-6 in the metropolises does not appear to augur well for the future of the country.

It is observed that the relative share of the metropolises with sex ratio of child population in the age group 0-6 has sharply declined during 2001-2011. Sharp declines have been reported in child sex ratios during 2001-2011 in 34 metropolises, which is highest noticed in Srinagar (-56) to lowest in Malappuram (-1). Comparatively, it has increased in only eighteen metropolises, ranging from one point in Bruhat Bangalore to forty six points in Ludhiana. The child sex ratio improved in Amritsar, Ludhiana, Delhi, Ghaziabad and Agra in the north, Rajkot, Vadodara and Ahmadabad in the west, Kozhikode, Kollam, Thiruvananthapuram, Kannur and Kochi in the south and Kolkata in the eastern part of India.

A substantial decrease of girl child was noticed in Srinagar and Varanasi metropolises. It has declined in all the metropolises of Maharashtra, Rajasthan, Madhya Pradesh, Bihar and Jharkhand. In Uttar Pradesh, out of seven metropolises, four have declined in their child sex ratio namely Varanasi, Lucknow, Meerut and Allahabad. It has also decreased in Surat in Gujarat. Importantly child sex ratio have also declined in south India which otherwise have more favourable sex ratio. A decline in child sex ratio noticed in Malappuram and Thrissur in Kerala and all metropolises in Tamil Nadu and Andhra Pradesh. The decline in child sex ratio has been equally common in rural as well as urban areas, although the magnitude is evidently on the higher in the rural areas in the 2001-11.

Table 3: change in sex ratio in metropolises, 2001-2011

Change		General Sex Ratio	Child Sex Ratio
Positive	0-20	Meerut, Vijayawada, Vadodara, Varanasi, Ahmadabad, Gwalior, Kochi, Bruhat Bangalore, Kota, Kanpur , Tiruchirappalli, Pune	Ghaziabad, Rajkot, Kozhikode, Kolkata, Kollam, Kanpur, Vadodara, Thiruvananthapuram, Durg-Bhilainagar, Kochi, Delhi, Bruhat Bangalore, Agra, Indore
	20-40	Thiruvananthapuram, Asansol, Durg-Bhilainagar, Chennai, Nagpur, Nashik, Jodhpur, Lucknow, Jaipur, Greater Visakhapatnam, Raipur, Jamshedpur, Jabalpur, Aurangabad, Agra, Hyderabad, Bhopal, Ghaziabad, Madurai, Amritsar, Indore	Ahmadabad, Kannur
	40 and above	Ludhiana, Kannur, Malappuram, Kollam, Kolkata, Thrissur, Faridabad, Kozhikode, Dhanbad, Allahabad, Delhi, Coimbatore, Ranchi, Srinagar, Patna, Greater Mumbai	Ludhiana and Amritsar
Negative	0-20	Rajkot, Surat,	Tiruchirappalli, Vasai Virar, Faridabad, Jodhpur, Chennai, Lucknow, Malappuram, Jabalpur, Raipur, Nagpur, Meerut, Gwalior, Surat, Bhopal, Thrissur, Greater Mumbai, Greater Visakhapatnam, Madurai, Coimbatore, Pune, Kota, Patna, Nashik, , Aurangabad
	20-40	Vasai-Virar	Jamshedpur, Hyderabad, Vijayawada, Jaipur, Asansol, Allahabad, Dhanbad, Varanasi, Ranchi
	40 and above		Srinagar

Source: computed from census of India, 2001 and 2011 final population totals, registrar general of India, New Delhi.

What are the reasons of sharp declines in the child sex ratios? Demographers studying these worsening sex ratios have attributed them to excess female mortality in infancy and early childhood and to a lesser degree, during women's reproductive years. They argue that excess female infant and child mortality reflects the strong gender bias in favour of sons given that at birth and during infancy and childhood and it is the biological norm for male mortality to exceed female mortality (Croll, 2001). A number of studies show that the use of new techniques to detect the sex of the foetus followed by the termination of a female pregnancy has become common in rich and poor in urban as well as rural area (Jeffery et al., 1984; Patel, 1989; Arora, 1996). Census 2001 also concludes that the neglect of the girl child resulting in their higher mortality at younger ages, high maternal mortality, sex selective female abortions, female infanticide and change in sex ratio at birth are the important reasons.

Conclusions

The sex ratio in the country had always remained unfavourable to females. In the beginning of 20th century in metropolises sex ratio was 798 that had declined to 705 in 1941 which was the lowest during more than a century (1901-2011). In the last decade it has continuously increased by 41 points in million cities and 10 points in the country as a whole. 52 million plus cities added more females as compared to males which is a healthy sign. Indian metropolises, which are the scenes of male excessive in migration, are characterized by a paucity of females. Literature highlighted that the male migration was dominated in the metropolises has been partially changed family and female migration after the liberalisation period due to availability of greater job opportunities. In fact, female percentage has increased continuously after Independence. The pattern of sex ratio when cross classified by size of class-I cities revealed that the sex ratio has decrease with the increasing population size. It is more favourable in cities with less than one million populations. There exist considerable regional variations in the magnitude of deficit of females across metropolises. The cities located in south India namely Kerala, Tamil Nadu, Karnataka and Andhra Pradesh are marked with a relatively more favourable sex ratio. As against this, Jammu Kashmir to Bihar and western state including all metropolises report a much more adverse sex ratio. It is observed that sex ratio in cities with million plus population is high where the urban and rural sex ratio of the state is high. Relatively speaking, southern metropolises sex ratio is more favourable to females in comparison to northern states.

The sex ratio in the age group 0-6 has declined by (- 2) point in metropolises in the last decade. At the regional level the child sex ratio is favourable in the south, east and north-east region. It is completely skewed in the western and north-western region of India which has largest deficit of girl child. The child sex ratio in cities with million plus population is high where the urban and rural sex ratio of the state is high. The decline in child sex ratio has been equally common in rural as well as urban areas, although the magnitude is evidently on the higher in the rural areas in the 2001-11. The census evidence suggests a clear cultural preference for male children, particularly among some north Indian states. Of recent, sex imbalances are also attributed to sex selection, which is most prevalent in urban areas amongst higher economic quintiles, and even for these groups the practice continues to be fuelled by a patriarchal structure that believes in, values and promotes son preference. Furthermore, as social norms are changing toward smaller families, the availability of and access to new technologies provide an easy way for parents to achieve such goals. Education, modernization and upward economic growth are not being protective to missing girls. Sex ratio is skewed in favour of males till now and has continued to rise. A strong public awareness and attitude of society can change this trend. This has drawn wide attention to the policy makers and planners to reverse the trend to bring it back to parity in the society.

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Appendices

Table 1: change of sex ratio in metropolises, 2001-2011

States	Name of UA/City	Sex Ratio			Child Sex Ratio		
		2011	2001	Change	2011	2001	Change
Kerala	Kannur UA	1171	1101	70	974	945	29
Kerala	Thrissur UA	1116	1058	58	948	960	-12
Kerala	Kozhikode UA	1102	1051	51	970	956	14
Kerala	Malappuram UA	1102	1036	66	963	964	-1
Kerala	Kollam UA	1095	1033	62	969	954	15
Kerala	Thiruvananthapuram UA	1066	1034	32	962	950	12
Kerala	Kochi UA	1030	1023	7	962	956	6
Tamil Nadu	Tiruchirappalli UA	1014	995	19	962	969	-7
Tamil Nadu	Madurai UA	997	977	20	947	950	-3
Tamil Nadu	Coimbatore UA	994	952	42	955	961	-6
Andhra Pradesh	Vijayawada UA	987	971	16	937	961	-24
Tamil Nadu	Chennai UA	985	955	30	951	967	-16
Andhra Pradesh	Greater Visakhapatnam MC	978	956	22	947	950	-3
Maharashtra	Nagpur UA	960	932	28	926	932	-6
Andhra Pradesh	Hyderabad UA	954	931	23	923	945	-22
Chhattisgarh	Durg-Bhilainagar UA	949	924	25	935	932	3
Chhattisgarh	Raipur UA	944	921	23	935	942	-7
West Bengal	Kolkata UA	935	869	66	947	941	6
Maharashtra	Aurangabad UA	928	902	26	872	887	-15
West Bengal	Asansol UA	925	890	35	925	957	-32

Madhya Pradesh	Indore UA	924	904	20	896	896	0
Uttar Pradesh	Lucknow UA	923	888	35	904	907	-3
Karnataka	Bruhat Bangalore UA	922	908	14	942	941	1
Madhya Pradesh	Bhopal UA	921	898	23	918	929	-11
Jharkhand	Ranchi UA	921	879	42	899	936	-37
Jharkhand	Jamshedpur UA	919	899	20	898	919	-21
Madhya Pradesh	Jabalpur UA	918	893	25	908	911	-3
Gujarat	Vadodara UA	918	906	12	852	833	19
Gujarat	Rajkot UA	906	907	-1	838	821	17
Maharashtra	Pune UA	904	899	5	896	903	-7
Jammu & Kashmir	Srinagar UA	903	838	65	865	921	-56
Rajasthan	Jodhpur UA	901	875	26	888	899	-11
Maharashtra	Nashik UA	900	870	30	866	883	-17
Rajasthan	Jaipur (M Corp.)	900	876	24	855	882	-27
Gujarat	Ahmadabad UA	898	884	14	846	822	24
Rajasthan	Kota (M Corp.)	895	885	10	885	899	-14
Jharkhand	Dhanbad UA	891	839	52	901	936	-35
Uttar Pradesh	Meerut UA	887	869	18	845	859	-14
Uttar Pradesh	Varanasi UA	887	872	15	875	913	-38
Maharashtra	Vasai-Virar City (M Corp.)	886	916	-30	911	917	-6
Bihar	Patna UA	885	840	45	880	896	-16
Punjab	Amritsar UA	883	863	20	825	781	44
Uttar Pradesh	Ghaziabad UA	881	858	23	849	837	12
Haryana	Faridabad (M Corp.)	874	817	57	847	848	-1
Madhya Pradesh	Gwalior UA	873	861	12	833	837	-4
Uttar Pradesh	Agra UA	873	847	26	857	854	3
NCT of Delhi	Delhi UA	868	822	46	873	870	3
Maharashtra	Greater Mumbai UA	863	822	41	910	919	-9
Uttar Pradesh	Kanpur UA	857	853	4	863	855	8
Uttar Pradesh	Allahabad UA	852	809	43	867	900	-33
Punjab	Ludhiana (M Corp.)	850	763	87	865	819	46
Gujarat	Surat UA	753	760	-7	809	827	-18
Metropolises		**917**	**876**	**41**	**901**	**903**	**-2**

Source: Census of India, 2001 and 2011 Final Population Totals, Registrar General of India, New Delhi.