Original Research Article

Imbalance Sex Ratio at Birth in Institutional Deliveries: May Reflect Female Foeticide Practice

Supriya Khare[1], Akash Mishra[2], BB Khare[3], RN Mishra[4]

[1]M.Sc. (Final) Student, Department of Statistics, Institute of Science, BHU
[2]Tutor Cum Statistician, GMC Medical College, Banda (UP)
[3]Professor, Department of Statistics, Institute of Science, BHU
[4]Professor, Div. of Biostatistics, Department of Community Medicine, IMS, BHU, Varanasi, India.

Corresponding Author: RN Mishra

ABSTRACT

Introduction: India observed imbalanced sex ratio since long back because of prevailing culture and traditions. Infanticides and neglect of girls during childhood were present which are now reduced to a large extent but female feticides after ultrasound machines became available widely in practice; the reason being a highly profitable to the medical professionals and society inclined too. UP and Bihar are also among the 7 states in terms of skewed sex ratio; may be neglect of girl child or female feticide. To view if female feticide is in practice, the objective of the present analysis was framed as: to explore the possibility of female foeticide, if expected, in Eastern Uttar Pradesh based on hospital statistics

The data & Statistical Analysis: The data used for this analysis was birth record of all the deliveries conducted in Sir Sunderlal (SS) Hospital during Jan 2009 to Dec 2015. A total of 17438 deliveries were carried during this period. The data has been analysed using SPSS Software. The difference between hospital born females and born with natural sex ratio (105 males: 100 females) was tested by Z test and association of sex ratio at birth with age of mother, year of birth and the distance of place of mother was assessed firstly by bivariate analysis and finally by logistic regression analysis.ged with Wald Statistic at 5% level of significance; the reference category considered for each of the characteristics was that the closest to natural sex ratio at birth. Further, was carried to assess the real strength of association by eliminating the effect of confounding variables.

Results: A gross deficiency in sex ratio at birth was recorded in all the age groups mothers. Further, sex ratio at birth was much lower among within 30 km and ≥250 km than those of 30- 100 km and 100-250 km. During 2012 the sex ratio was much near to natural sex ratio at birth, but much lower in rest of the years. Logistic regression indicated mothers of age group <20 and 25-30 years observed almost similar sex ratio at birth but much lower in the age groups 30-35 and ≥35 years when compared with mothers of age group 20-25 years while reference to year of birth 2012, the born child will be a girls was lesser by almost 12% during 2009 to 2011 and 2013 to 2015. Sex ratio was almost similar irrespective of the distance of place of residence of the mother.

Conclusion: The gross imbalance sex ratio is suggestive of sex selective abortion and local authority has to be more vigilant through effective surveillance of Ultra-sonography houses.

Key words: Childhood, sex ratio, ultra-sonography, infanticide, feticide,

INTRODUCTION

India, being a strong male preference society experiences imbalanced sex ratio since long back; the reason behind was the prevailing culture and traditions. Since past two decades rise in sex ratio is recorded i.e.

from 927 in 1991 to 933 in 2001 and thereafter 940 in per 1000 males. [1-3] But, still neglect of girls during childhood are present resulting in early death [3-5] female infanticides to some extent [6,7] and more recently antenatal sex determination and female feticide, [8] these all combined contribute to imbalance sex ratio. Reports suggest that sex selective abortion was more common in 1990s [9,10] after ultrasound machines became available widely in the 1980s. [11,12] The relative contribution of these modes of discrimination to the unbalanced sex ratio in India is still unresolved [13] and was suggested to resolve this issue through appropriate targeted remedies before it threatens the stability and security of society. [14] Attitude of society towards male preference still in existence in every segment of society irrespective of religion, caste, education and economic status; because sons are considered asset to the family and females as the financial burden; may be to some extent due to prevailing culture of heavy dowry system; moreover females after marriages settle down to other families, hence, treated as a temporary member of the family. The female infanticide, a brutal unlawful act, was tried to prevent by the Indian government, but sex preference attitude is still in persistence and a leading cause of continued female feticide. Ultrasonography machine devised for diagnosis of diseases came widely in practice to determine sex of those preferring male sex indicating replacement of female infanticide by female feticide to a major extent. This has been reported widely in practice in some of the states like Haryana, Jammu and Kashmir and Punjab showing less than 900 females per 1000 male births. [15] Though, under the law of pre-conception and pre-natal diagnostic technique act (PCPNDT) 1994 that amendment further in 2003 considering female feticide a cognizable, non-bail able and non-compoundable offence with a punishment of 3 years imprisonment to all involved in; still it seems poor implementation of the act as highly

imbalanced sex ratio at birth can be noticed; reason behind it being a highly profitable to the medical professionals and society is inclined too. Evident from a hospital birth records that if the first child was a girl, the sex ratio was 716 girls to 1000 boys and if the first child was a boy it was 1140 girls to 1000 boys [16] which is the counter to the normal biological tendency; though, probability of having another male child increases for families with previous number of males. [17] Uttar Pradesh and Bihar are the other two worst-performing states in terms of skewed sex ratio but better than Haryana, Jammu and Kashmir and Punjab. Uttar Pradesh is a state with poor literacy and socio economic condition and has much faith that a child is a gift of God; hence feticide may be least practiced; but strong male sex preference amongst literate society may lead to female feticide. Since, most of mothers who proceed for institutional deliveries are economically better and literate; hence imbalanced sex ratio of institutional deliveries may suitably reflect the practice of female feticides. Thus, the objective of the present analysis was considered as:

Objective
To explore the female foeticide practice, if happens, in Eastern Uttar Pradesh based on hospital deliveries

The data & Statistical Analysis
The data used for this analysis was birth record of the Departments of Obstetrics and Gynaecology of Faculty of Medicine and Prasuti Tantra of Faculty of Ayurveda, Sir Sunderlal (SS) Hospital since Jan 2009 to Dec 2015. SS hospital is a tertiary care hospital catering health services to about 160 million populations of eastern Uttar Pradesh, western Bihar, part of Madhya Pradesh and Chhattisgarh including neighbouring country Nepal. The deliveries carried in SS Hospitals are initially registered and non-registered along with complicated referred from distant places. A total of 17438 deliveries with on an average

2491 were carried during the period under study. Birth register mainly records mother's name, age and address including child sex, weight, height and gestational weeks. Out of 17438 births, records of 17155 births were complete for all the characteristics; the details of records of birth history are presented in Table-1.

Table-1: Year wise birth records history and female born per 1000 male in SS Hospital

Sl. No.	Birth Year	Number of births	Complete Record of Birth History	No. of female born per 1000 male
1	2009	2330	2193	802
2	2010	2336	2291	821
3	2011	2236	2188	826
4	2012	2592	2574	946
5	2013	2487	2480	876
6	2014	2613	2596	891
7	2015	2844	2833	818
Total		17438	17155	855

The data has been analysed using SPSS Software. The data was first entered in Excel-07and was imported thereafter to SPSS and then verified and cleaned for any wrong entry. Initially, the background characteristics of the mother and new born were obtained. The difference between hospital born females and born with natural sex ratio (105 males: 100 females) was tested by Z test. To assess the association of sex ratio at birth with age of mother, year of birth and the distance of place of mother, firstly bivariate logistic regression analysis was carried and crude odds ratio was obtained (COR); the association was judged by Wald Statistic at 5% level of significance; the reference category considered for each of the characteristics was that the closest to natural sex ratio at birth. Further, multivariate logistic regression analysis was carried to assess the real strength of association by eliminating the effect of confounding variables and adjusted odds ratios were obtained.

RESULTS

As evidenced from Table-2, maximum mothers (41.7%) delivering at SS Hospital were of age group 25-30 years followed by 37.1% of age group 20-25 years. Nearly one fifth (21.2%) deliveries were in high risk age out of which one third (30.2%) were in very high risk age group i.e. either below 20 years or 35 years & above. More than half (54.2%) mothers were from within 30 km, while 35.1% were from 30-100 km; very few about 5% each

were from 100-250 km and ≥ 250 km distance respectively. The percent of deliveries was showing increasing trend since 2009 till 2015 except slightly less in 2011.As indicated, the percent of female births and male births along with their 95% confidence limit; gross deficiency in sex ratio at birth was recorded in all the age groups mothers (857 females or below per 1000 males) except 20-25 years and was much low in the age group ≥ 35 years (697 females per 1000 males). The sex ratio at birth among mothers of within 30 km and ≥ 250 km was much lower than those of 30-100 km and 100-250 km. According to the year of birth, sex ratio and percent of female born it was lowest (802 females or below per 1000 males) during 2009 with slight increase during 2010 and 2011. During 2012 the sex ratio was much near to natural sex ratio at birth (946 females or below per 1000 males) but down fall in sex ratio at birth was further observed in 2013, 2014 and 2015 respectively (876, 891 and 818 females per 1000 males).

Though, bivariate logistic regression analysis indicated association of sex ratio imbalance with age of the mother, distance of place of residence as well as year of birth (Table-3; COR values); the true strength of association cannot be established due to their confounding effect with each other, hence to the multivariate logistic regression was carried and the adjusted odds ratios (AOR) were obtained presented in Table-3. Compared to the mothers of age group 20-25 years, mothers of age group < 20 and 25-

30 years observed almost similar sex ratio at birth i.e. the odds ratio of being a girl child were 0.87 (95% CI: 0.68 – 1.11) and 0.95 (95% CI: 0.89 – 1.02) respectively; while among mothers of age group 30-35 and ≥ 35 years, the odds ratio of being a girl child were 0.88 (95% CI: 0.81 – 0.97) and 0.77 (95% CI: 0.67 – 0.89). Reference to year of birth 2012, the odds ratio of being a girl child during 2009 to 2011 were lesser (OR = 0.85; 95% CI: 0.76 – 0.95 in 2009, OR = 0.87: 95% CI: 0.78 – 0.97 in 2010 and OR = 0.88: 95% CI: 0.78 – 0.98 in 2011); while almost similar during the years 2013 (OR=0.92; 95% CI: 0.83 – 1.03) and 2014 (OR=0.94; 95% CI: 0.85 – 1.05) but had further declined statistically in 2015 (OR=0.87; 95% CI: 0.78 – 0.97). Sex ratio was almost similar irrespective of the distance of place of residence of the mother.

Table-2: Background characteristics of mothers and sex ratio of new born

Characteristics	No. of deliveries (N)	% of mothers delivering	No. of female per 1000 male born	Z value	P value	Female born %	95% CI	Male born %	95% CI
Age of mothers									
Below 20	275	1.6	786	11.4	<0.0000	44.0	38.1-49.9	56.0	50.1-61.9
20-25	6358	37.1	902	5.09	<0.0000	47.4	46.2-48.6	52.6	51.4-53.8
25-30	7155	41.7	857	8.0	<0.0000	46.1	44.9-47.3	53.9	52.7-55.1
30-35	2537	14.8	798	10.9	<0.0000	44.4	42.5-46.3	55.6	53.7-57.5
35 & above	830	4.8	697	14.7	<0.0000	41.1	37.8-44.4	58.9	55.6-62.2
Distance of place of Residence									
Within 30 km	9303	54.2	834	9.2	<0.0001	45.5	44.5-46.5	54.5	53.5-55.5
30- 100 km	6021	35.1	890	5.9	<0.0001	47.1	45.8-48.4	52.9	51.6-54.2
100-250 km	856	5.0	894	5.7	<0.0001	47.2	43.9-50.5	52.8	49.5-56.1
≥ 250 km	975	5.7	806	10.5	<0.0001	44.6	41.5-47.7	55.4	52.3-58.5
Birth year									
2009	2193	12.8	802	10.7	<0.0001	44.5	42.4-46.6	55.5	53.4-57.6
2010	2291	13.4	821	9.8	<0.0001	45.1	43.1-47.1	54.9	52.9-56.9
2011	2188	12.8	826	9.6	<0.0001	45.2	43.1-47.3	54.8	52.7-56.9
2012	2574	15.0	946	0.87	>0.1921	48.6	46.7-50.5	51.4	49.5-53.3
2013	2480	14.5	876	6.9	<0.0001	46.7	44.7-48.7	53.3	51.3-55.3
2014	2596	15.1	891	5.9	<0.0001	47.1	45.2-49.0	52.9	51.0-54.8
2015	2833	16.5	818	10.0	<0.0001	45.0	43.2-46.8	55.0	53.2-56.8

Table-3: Characteristics influencing sex determination: Logistic regression analysi

Character	COR	P value	95% CI of OR	AOR	P value	95% CI of OR
Age of the mother (Years)						
< 20	0.87	0.264	0.68 – 1.11	0.87	0.273	0.68 – 1.11
25-30	0.95	0.135	0.89 – 1.02	0.95	0.123	0.89 – 1.02
30-35	0.88	0.009	0.81 – 0.97	0.88	0.009	0.81 – 0.97
≥ 35	0.77	0.001	0.67 – 0.90	0.77	0.000	0.67 – 0.89
20-25	--	--	--	--	--	--
Year of birth						
2009	0.85	0.005	0.76 – 0.95	0.85	0.004	0.76 – 0.95
2010	0.87	0.014	0.78 – 0.97	0.87	0.015	0.78 – 0.97
2011	0.87	0.021	0.78 – 0.98	0.88	0.022	0.78 – 0.98
2013	0.93	0.175	0.83 – 1.04	0.92	0.160	0.83 – 1.03
2014	0.94	0.283	0.85 – 1.05	0.94	0.290	0.85 – 1.05
2015	0.87	0.008	0.78 – 0.96	0.87	0.010	0.78 – 0.97
2012	--	--	--	--	--	--
Place of residence						
Within 30 km	0.93	0.335	0.81 – 1.07	0.93	0.307	0.81 – 1.07
30- 100 km	1.00	0.959	0.86 – 1.15	0.99	0.897	0.86 -1.14
> 250 km	0.90	0.269	0.75 – 1.08	0.90	0.258	0.75 – 1.08
100-250 km	--	--	--	--	--	--

DISCUSSION

It has been quoted that women's relative rarity will increase their value and social status that will result to more desire of female offspring [18] When there is a shortage of women in the marriage market the women can 'marry up' inevitably leaving the least desirable men with no marriage prospects [19] that may lead to violent crime by young unmarried low status males. [14] Thus, a natural sex ratio is the essential component of healthy society. Sex ratio imbalance due to female feticide will definitely pose a serious threat to

society and the nation at large. Gender ratio in India, though shifting that was occurring due to higher female mortality, but the unbalancing sex ratio at birth due to sex-selective abortion will now may pose many potentially serious threats and consequences. The adverse child sex ratio can severely impact the delicate equilibrium of nature and destroy our moral and social fabric. Loss of women is likely to have negative consequences on the economy; women being a vital part of India's labour force. Moreover, there will be an increase in acts of violence against girls and women e.g. rape, abduction, trafficking. The present analysis based on 17155 births with 855 female born indicates almost 100 females are missing at the time of birth only. Lowest sex ratio (802 females per 1000 males) with slight changes in subsequent years except in 2012 is an indication of continued sex selective feticides in this region too in those subset of mothers practicing utilization of health care delivery system, may be urban based and literate. Except 20-25 years of age of mothers, deficiency in sex ratio at birth was recorded and gross deficiency in sex ratio was among those of age $\geq$ 35 years; probably those with more female children only. Mothers attending SS Hospital for deliveries either nearer or from distant places; the sex ratio at birth was almost similar with deficiency of female births. Statistically significant value as 0.88 and 0.77 of being a girl child among mothers of 30-35 and $\geq$ 35 years age group compared to the mothers of age group 20-25 years mirrors the practice of female feticides; perhaps in these age groups either absence or lesser male children, mothers might have gone through sex determination. If this act is continued without break, a high unbalanced sex ratio will be observed in this region too. The sex ratio may be further distorted due to poor nursing and care of female surviving children. The evil of drastic fall in sex ratio, if not checked well in time, will be bringing violence, crime and end to remaining social values, ethics and a state of complete chaos.

CONCLUSION

The gross imbalance sex ratio is suggestive of sex selective abortion and local authority has to be more vigilant through effective surveillance of Ultra-sonography houses.

REFERENCES

1. Census of India. 2001. Office of the Registrar General & Census Commissioner; Ministry of Home Affairs, Government of India.
2. Sudha S, Rajan SI. Development and Change, Vol. 30; Oxford: Blackwell publishers Ltd; 1999. Female demographic disadvantage in India 1981–1991: Sex selective abortions and female infanticide; 585–618.
3. Ghosh S. The female child in India: a struggle for survival. Bull Nutr. Found India, 1987; 8:4.
4. Chatterjee M. "A report on Indian women from birth to twenty", New Delhi; National Institute of Public Cooperation and Child Development; 1990.
5. Khanna R, Kumar A, Vaghela JF, Sreenivas V, Puliyel JM. Community based retrospective study of sex in infant mortality in India, Br Med J, 2003; 327:126–130.
6. George S. Female infanticide in Tamil Nadu, India: From recognition back to denial? 1997. Available at: www.womenstudies.in/elib/sex.../ss_female_infanticide_in_tamil.pdf (accessed on Feb. 23, 2017)
7. Leidl P. Silent springs: The tragedy of India's never-born girls. The State of World Population 2005, the promise of equality: Gender equity, reproductive health and the millennium development goals United Nations Population Fund. 2005. Available at: https://mr-potter.wikispaces.com/.../2+Article-Silent+Spring+India's+Pop.doc (accessed on Feb. 23, 2017).
8. George S. Sex selection/discrimination in India: contemporary developments. Reproductive Health Matters. 2002; 10: 190–192.
9. Gangadharan S. Second sex or subordinate sex? 1991. The Economic Times April 18.

10. Visaria PM. Overall stability in growth not demographic inertia. 1991. The Economic Times April 18, 1991.
11. Sen A. Missing women revisited. Br Med 2003; 327:1297–1298.
12. Grover A, Vijayvergiya R. Sex ratio in India. Lancet; 2006; 367:1726.
13. George S, Rajaratnam A, Miller BD. Female infanticide in rural India. Search Bull. 1998; 12: 18–26.
14. Hesketh T, Xing ZW. Abnormal sex ratio in human population. 2006. Available at: https://www.ncbi.nlm.nih.gov/pmc/artic les/PMC1569153/ (accessed on Feb. 23, 2017).
15. Sex ratio in Haryana worst among all States, Tue, 30 Apr 2013-07:48pm, New Delhi, PTI; Available at: www.dnaindia.com/.../report-sex-ratio-in-haryana-worst-among-all-states-1829031. (accessed on Feb. 23, 2017)].
16. Sahni M, Verma N, Puliyel J. Missing girls in India: infanticide, feticide, and made-to-order pregnancies? Insight from hospital based sex ratio at birth over the last century. PLoS One; 2008;3 (5): e2224.
17. Biggar RJ, Melbye M. Sex ratio, Family size and Birth order. Amer J Epi; 1999; 150: 957–61.
18. Levy N. Against Sex Selection. Southern Med J. 2007; 100(1): 107–9.
19. Zeng Y, Tu P, Gu B, Xu Y, Li B, et al. Sex selective abortions and female infanticide; Population Development Review; 1999; 19: 283–302.

How to cite this article: Khare S, Mishra A, Khare BB. Imbalance sex ratio at birth in institutional deliveries: may reflect female foeticide practice. Int J Health Sci Res. 2017; 7(7):16-21.

****