Published in final edited form as:

J Christ Nurs. 2016 ; 33(1): E7–E15. doi:10.1097/CNJ.0000000000000244.

India's Distorted Sex Ratio: Dire Consequences for Girls

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Abstract

Female gender discrimination related to cultural preference for males is a common global problem, especially in Asian countries. Numerous laws intended to prevent discrimination on the basis of gender have been passed in India, yet the distorted female-to-male sex ratio seems to show worsening tendencies. Using detailed, two-year longitudinal chart abstraction data about delivery records of a private mission hospital in rural India, we explored if hospital birth ratio data differed in comparison to regional data, and what demographic and contextual variables may have influenced these outcomes. Using quantitative chart abstraction and qualitative contextual data, study results showed the female-to-male ratio was lower than the reported state ratio at birth. In the context of India's patriarchal structure, with its strong son preference, women are under tremendous pressure or coerced to access community-based, sex-selective identification and female fetus abortion. Nurses may be key to turning the tide.

Keywords

feticide; gender discrimination; India; nursing; prenatal sex identification; selective abortion; sex ratio

Female gender discrimination due to a cultural preference for males is a common global problem, particularly in Asian regions. India is no exception. Gender discrimination manifesting as increased female mortality, female infanticide, and sex-selective abortion has received considerable attention in recent years. The sex ratio trend in India indicates a growing imbalance, with estimates from the 2011 census indicating approximately seven million fewer girls than expected in the 0-to-6 age group (Bharadwaj & Lakdawala, 2013; Chamarbagwala & Ranger, 2010; Jha et al., 2011; Sahni et al., 2008).

Sex ratio, defined as the ratio of one sex to another (Last, 2001) is the statistic most often reported to describe this phenomenon. Most epidemiologic literature uses the term sex ratio to denote the number of males per 1,000 females in a given population. However, in India,

the *sex ratio* is calculated on the number of females per 1,000 males in the defined population (Joshi & Tiwari, 2011).

Christian nurses' perspective is underpinned by a belief in the sanctity of life; in short, all life is sacred and valuable, created in God's own image (Genesis 1:26) (Orr, 2009; Pence, 2007). Although all nurses provide compassionate care, Christian nurses have a special role when they work in environments where cultural patterns of disparities and injustice are prevalent; to provide care, as well as educate and be sensitive to the pressure affected individuals may feel. One such area is the effect on women, who often are conflicted when it comes to societal/cultural expectations about gender discrimination at birth. Informed by Scripture, Christian nursing care is impacted by the perspective that "...in the image of God he created them; male and female he created them" (Genesis 1:27, NIV). Christian nursing practice is guided not only by these values, but also knowledge of current issues. The research presented here provides cultural context to guide nurses and other healthcare professionals planning interventions.

SEX RATIO IN INDIA

At birth, boys in India naturally outnumber girls by 3% to 7%, meaning the expected female-to-male sex ratio is 0.93 to 0.97. However, when the sex ratio at birth is skewed in favor of male babies, it indicates human meddling by means of sex identification and sex-selective abortion (Singh, 2010). India is one of several countries where such concerns are persistent and significant (Guilmoto, 2012). Numerous laws intended to prevent discrimination on the basis of gender have been passed over the years in India (Basu, 2009), yet the distorted female-to-male sex ratio seems to show worsening tendencies (Jha et al., 2011).

At birth, boys naturally weigh more than girls (whether in the West or Asia), yet boys' mortality rate also is inherently higher (Hong et al., 2007; Singh, 2010). Therefore, when the mortality rate of infants and children is higher for females, nurses should be aware this is a warning sign that neglect of the female child may be occurring (Singh).

A normal adult sex ratio of at least 1.05, women-to-men, is based on countries where equal care is received. In India, the 2013 estimated sex ratio for adults aged 25 to 54 in India was 0.94 women-to-men (Central Intelligence Agency, 2013). Croll (2000) points out that the sex ratio of females-to-males is even more disturbingly low among the 0-to-10 age group, particularly among those 0 to 4 years of age. According to the 2001 Census of India, the child sex ratio (0–6 years of age) was 0.927, declined from 0.945 in 1991 (Paul et al., 2011). This declining pattern continues, as the provisional results of the 2011 Census of India indicate the child sex ratio (0–6 years) is 0.914 (Government of India, 2013). The National Family Health Survey-2 data indicate that among Indian women, who had ultrasound or amniocentesis during antenatal care, an estimated 6.4% of female fetuses were likely aborted (Paul et al.). This is done to increase the number of male babies born within the family, thus obtaining the desired family composition of having more sons than daughters (Agrawal, 2012). Given these data, there are realistic fears that prenatal sex determination

and the old practices of female infanticide combine in today's Indian society (Guilmoto, 2012; Jha et al., 2011).

Based on European history, demographic experts had anticipated decreased son preference with India's strong economic development. However, in Asia, son preference has actually increased with economic development, decreased fertility rates, and small family size. The difference in how son preference continues to evolve in Asia is due to deep cultural roots regarding gender identity (Croll, 2000; Das Gupta et al., 2003). Indeed, in India, son preference is present across differing groups of socioeconomic status, education levels, castes, tribes, religions, and state of residence (Paul et al., 2011).

Likewise, Sev'er (2008) notes gender discrimination across the female lifespan in India, and compellingly links the dowry (bride price) system and sex selection practices. Sev'er notes that areas where violence related to dowry dispute is highest, adult and child sex ratios are the most skewed. The dowry system casts daughters as a liability, a net loss or economic ruin of her family. This entrenched way of thinking is rooted in Hindu culture and perpetuated by maxims such as "raising a daughter is like watering a neighbor's plant" and "a son spells rewards, a daughter expense" (Hedge, 1999, p. 18).

SEX DETERMINATION

If sex determination sonography is utilized, a woman may be forced to undergo an abortion by the family, resulting in female feticide (Puri, Adams, Ivey, & Nachtigall, 2011). If the baby's gender is unknown until birth, a female child is at risk of infanticide. Sev'er (2008) succinctly summarizes the vicious cycle of female life and death in India, stating that "the problem lies in the attitudes toward women, the lower status of girl children and the fear of the dowry burden" (p. 68).

Sahni et al. (2008) note the continuing importance of using hospital records for collecting data on sex ratio at birth that is not influenced by female feticide and neglect of girl children. A distorted sex ratio at birth may be considered indirect evidence of prenatal sex determination, followed by sex-selective abortion (Pham, Hall, & Hill, 2011).

Though it is difficult to find alternate explanations for distorted sex ratio at birth, interpretation must be carefully considered. Chamarbagwala and Ranger (2010) noted regional variations across India, as well as other patterns. For instance, larger families (3 children) had greater gender equality than smaller families. This may be because if sons are born first, the couple may choose not to have any more children, whereas other couples continue having children until the desired number of sons is attained. In a qualitative study, respondents indicated that couples often continue to have children until they have at least one son (Chor, Patil, Goudar, Kodkany, & Geller, 2012).

The inconsistent birth registry or incomplete vital statistics system in India could influence the calculation of sex ratio at birth in various regions (Manchanda, Saikia, Gupta, Chowdhary, & Puliye, 2011). Poor data quality and availability complicate the interpretation of sex differences (Sawyer, 2012).

Additionally, technology has made preconception sex determination possible by two methods: X and Y sperm separation and preimplantation genetic diagnosis. These methods were touted as more ethical means of ensuring the birth of a boy. However, these preconception methods have contributed very little to India's skewed sex ratio, likely due to their invasive nature and high cost (Madan & Breuning, 2014).

EXPLORING SEX RATIOS

The purpose of this study was to evaluate the sex ratio at birth at a small mission hospital in rural India. In light of its Christian mission to serve all human beings equally, the hospital set out to carefully follow and implement Indian law, which actively seeks to deter sex identification. Our desire was to better understand the female-to-male sex ratio through research, in order to guide future interventions by the nurses and other healthcare professionals in a culturally relevant way.

Following institutional review board approval, we reviewed hospital birth records for deliveries in 2010 and 2011 ($N = 1110$) in a 100-bed, rural mission hospital. Data included demographic variables, such as maternal age, religion, town or village of residence, and whether or not women had preregistered for delivery at the hospital. Additionally, we abstracted data on comorbid medical conditions, parity, history of previous stillbirth, delivery method, and newborns' gender and weight. Mothers' weights were not available, and therefore baby weights were considered a proxy indicator of maternal nutritional status and direct indicator of baby health status. We then analyzed these data using t -tests, and calculated sex ratios. We also conducted post hoc analysis using t -tests, comparing women on the general ward to women in private rooms, as private rooms are a comparatively expensive choice.

To further explore our findings with trend analyses, we used the aggregate delivery data for 2001–2013 that the hospital reports to local governmental agencies. These data consist of total number of births by gender for each month. These totals were then summed for annual totals.

To explore these quantitative patterns further, we conducted 17 qualitative key informant interviews. As encouraged in qualitative research, triangulation was sought for the purpose of gaining a broad perspective and convergent validation (Berg, 2009). All potential participants we approached consented to participate. The informed consent form was written in English and in Hindi, and read to participants who were illiterate, who signed with their thumbprint. Interviews were conducted with hospital staff (physicians and nurses), women who had delivered at the hospital, accompanying family members, and village council members. A semistructured interview guided open-ended questions regarding prenatal care, preferred delivery methods and setting, fertility expectations, and customary practices. All interviews were audio-recorded, translated, and transcribed verbatim. Transcripts were coded and organized into categories with sub-codes by two independent coders. This allowed querying the data for emerging themes (Corbin & Strauss, 2008), using the immersion method to gain a sense of the whole picture, followed by coding of key concepts, and emergent themes analysis (Patton, 2002; Tashakkori & Teddlie, 2003).

BIRTH DATA RESULTS

The two-year chart abstraction included all births ($N = 1127$). In 2010, there were 536 deliveries, including 16 sets of twins for a total of 552 births. In 2011, slightly more deliveries ($n = 563$) included 11 sets of twins and one set of triplets for a total of 576 births (Table 1). The difference in percentage of low birth weight babies for each year was not statistically significant, 37.9% and 39.7 % in 2010 and 2011, respectively. The lowest birth weight recorded was 960 grams, and the maximum was 4,400 grams (normal weight is 2,500–4,500 grams).

The mean weight for all male babies was statistically significantly higher than for all female babies (Table 2). In both years, most mothers were in the general ward, rather than private rooms. Babies born to mothers in private rooms weighed statistically significantly more than babies born to mothers in the general ward.

Further analysis revealed no significant difference between mothers in 2010 and 2011 (Table 1). However, in both years, sex ratio at birth differed by variables of the mother such as gravida, vaginal, or C-section, and the like (Table 3). Although the 2011 data were higher across all variables, notably the sex ratio was higher among primigravidas than multigravidas.

Both years, over 89% of the women came to the hospital for delivery unbooked (i.e., not preregistered for delivery at the hospital, often indicating mother or infant distress requiring professional medical attention). In 2010, the sex ratios for babies born to mothers who were booked or unbooked were the same, 0.67 female-to-male. In 2011, the sex ratio for babies born of mothers who were unbooked was higher than of mothers who were booked, 0.82 and 0.79, respectively.

Deliveries by Cesarean section totaled 61.8%; 38.2% were born by vaginal delivery with or without the use of forceps in 2010. The female-to-male sex ratio for babies born by Cesarean section in 2010 was 0.61. In 2011, the Cesarean section rate (58.7 %) had decreased, whereas the sex ratio for babies born by Cesarean section (0.76) had increased. Sex ratios for vaginally delivered babies were higher than for Cesarean section delivered babies in 2010 and 2011, 0.79 and 0.87, respectively.

In 2010, the sex ratio for babies born of mothers in the general ward was 0.67, whereas the sex ratio for babies born of mothers in private rooms was 0.74. In 2011, the opposite is true, with a higher sex ratio for babies born of mothers on the general ward (0.84) versus (0.74) for babies born of mothers in private rooms.

The overall sex ratios from 2001 to 2013 indicate wide variations in the female-to-male sex ratio from year to year. However, there is generally a trend upward from 2001 to 2006 where it peaked, but declined again to nearly the baseline (Figure 1). Sex ratios calculated on mothers' variables for 2010 and 2011 were consistently higher in 2011, with the exception of the sex ratios for babies born of mothers in private rooms, which did not change.

INTERVIEW RESULTS

The relevant themes identified in the interviews were social norms and expectations related to fertility, son preference, and reproductive health-related decision making. Social norms and expectations related to fertility were expressed as the expectation to be pregnant within the first year of marriage, a young woman's value as being derived from fertility, and dire consequences if she failed to produce offspring—particularly male offspring. One woman said:

“I am waiting for a baby—to be pregnant again [after stillbirth]. That is the only thing that will save me.”

Son preference was talked about as a societal preference rather than mothers' personal preferences. The mothers expressed the desire for healthy children but also expressed the need to meet the direct or implied pressure to produce sons. For example, “My husband tortured me because I gave no son. I had only daughter; I had to leave.”

Reproductive health decision making was discussed as decisions others had made for the women being interviewed. Husbands and in-laws routinely made the decisions regarding family planning, diet, and workload for the pregnant woman, who would attend the birth, and where the birth would take place. Most women were resigned to the fact that they did not take part in the decisions regarding their own reproductive health: “A wife cannot go to [to hospital/clinic] without husband's knowledge and permission.”

Although no one ever directly confessed to the practice of selective abortion, at the end of a key informant interview, a local Dai (birth attendant) noted the easy availability of sex identification ultrasound, and that it was “easy enough” to get. The implicit suggestion was that knowledge of a female pregnancy, in the context of the local norms, gave families knowledge that they could “somehow” act upon.

DISCUSSION

This study took place in a mission hospital that strictly adheres to Indian law prohibiting prenatal ultrasound for the purpose of sex determination. Routine medical records typically include the gender of babies born at this small, rural hospital; however, the records had never been analyzed. Notably, staff worked hard to comply with the law and discouraged gender discrimination. Thus, our results were initially met with an overt assumption of error. After careful review of medical records, data, and reanalysis, the skewed sex ratio was acknowledged, though not accepted, as an indication of gender discrimination. Two assumptions were stated by the director of the hospital and widely corroborated by the staff. First, the women presenting for delivery at the facility were from poor families, who could not afford to have obtained ultrasound sex determination elsewhere, even if desired. Second, there were no other ultrasound facilities within the area. Therefore, alternate explanations were sought through various types of reanalysis and our qualitative contextual work.

Discussion produced the idea that among the women who were on the general ward after delivery, the sex ratio would surely be normal, as these women were the poorest of those

presenting for delivery. Furthermore, women who could afford a private room were acknowledged to perhaps have the means to have sought sex determination sonography in the city, thereby skewing the sex ratio of babies born at the hospital.

Based on these discussions, we conducted secondary post hoc review of the medical records, broken down by delivery in the general ward or in a private room. Greater than two-thirds of the women were on the general ward, and the sex ratio at birth was masculinized, meaning there were more male than female babies. These results do not support the assumption that the approximate one-third of women of greater means (indicated by their private room status) were practicing sex selection at such a high rate as to skew the sex ratio at birth for all deliveries. In fact, in 2010, the sex ratio at birth among babies born of mothers on the general ward was even more skewed in favor of boys.

Furthermore, our qualitative analyses validated our quantitative chart abstraction data. In previous ethnographic work, social norms and expectations such as early marriage and subsequent childbearing within the first year; strong son preference that jeopardizes the well-being of women who fail to produce sons; and young mothers with little or no say as to who will attend the birth, where her baby is delivered, or how many children to have (Roberts, Anderson, Lee, & Montgomery, 2012) were emerging themes influencing fertility patterns. Therefore, these factors informed the selection of variables in the current data abstraction. Additionally, as noted earlier, due to the relationship built between the researcher and a local Dai (traditionally trained midwife) over the course of the study, we yielded anecdotal verification of a well-known, accessible ultrasound service located on the other side of the river and used by some of the poorest local residents. In light of the converging evidence, our interpretation of likely sex-selective abortions was deemed reasonable by the local residents and professional community, supporting face validity (Patton, 2002).

UNDERSTANDING SKEWED RECORDS

Review of the medical records also revealed that the sex ratio at birth was more skewed toward male babies among multigravidas than primigravidas, and likewise more skewed among C-sections than vaginal deliveries. The fact that the sex ratio is worse (higher ratio of boys) among multigravidas likely reflects family composition choice based on birth order and sex of previous children (Agrawal, 2012; Manchanda et al., 2011).

The lower sex ratio among C-sections compared to vaginal deliveries provokes additional concerns. As women are brought to the hospital for emergency C-section after problems arise during attempted home delivery, it is plausible that if a woman is known to be carrying a son, she is more likely to be brought to the hospital for C-section than if she is known to be carrying a female child. Could families possibly be more likely to allow nature to take its course in hopes that a female will be stillborn? Or if a woman is known to be carrying a daughter, is her family less likely to bring her to the hospital for delivery so that the baby can be disposed of without any official record of her birth? These are challenging and uncomfortable issues that are difficult to contemplate; however, the data are clear, and our interpretation is not outside the realm of reality in this social context, where historically

female children have been considered undesirable as an inherent burden to their families (Sev'er, 2008). Unfortunately, this sentiment continues to be expressed currently, as reported in the popular press: "Some parents would pay to save only male infants.... One woman who recently had fraternal twins, a boy and a girl, refused to breast-feed the girl, so the boy 'wouldn't get hungry'" (Magnier, 2013).

The average, overall female-to-male sex ratio of .76 in this study is lower than the 2011 sex ratio at birth reported for the state of Chhattisgarh at .95, and the reported age 0-to-6 sex ratio of .96. Aggregated data obscure some variability. For instance, at the district level, the lowest sex ratio reported in Chhattisgarh is .87 and the highest is 1.1 (Chandramouli, 2012). The national sex ratio at birth, according to 2009–2011 data, was .90, whereas the overall sex ratio per 2011 Census was .94 (UN Women, 2014). The vast majority of births in India are home births (Singh, 2010), and greater than 89% of the women who gave birth at this facility did so only after failure to deliver at home. Therefore, the sex ratio at birth in our study represents high-risk deliveries, and perhaps families seeking professional medical help more so for male babies than for female babies. Despite the best efforts of the Christian medical director and hospital staff to work against sex-selective abortion and infanticide, the birth records indicate that it has already occurred *before the women reach the mission hospital doors*. The low sex ratios across both years of this study confirm continued gender discrimination—that there are fewer girls than expected, as also noted in this region of India (Bassani et al., 2010). Sex-selective abortion is highly prevalent in India (Paul et al., 2011), is likely combined with other ways of seeking less care if a female baby is involved (Bharadwaj & Lakdawala, 2013), and is a plausible explanation for the distorted sex ratio at birth (Jha et al. 2011).

ALTERNATIVE EXPLANATIONS?

Alternative explanations for a skewed sex ratio of the general population include human trafficking (Madan & Breuning, 2014), and decreased fertility rates (Guilmoto & Duthé, 2013). However, outside of specific biologic phenomenon such as ionizing radiation, as hypothesized in Cuba and Russia (Scherb, Kusmierz, & Voigt, 2013), it is much more difficult to explain a distorted sex ratio at birth in India. Underreporting or undercounting, blamed on the inadequate vital registration system, does not explain the continued decline of the sex ratio among 0-to-6 year olds in India (Madan & Breuning). The regularity of this decline indicates true imbalance rather than artifact (Guilmoto & Duthé). The Registrar General and Census Commissioner of India reported that the low 0-to-6 year old child sex ratio was primarily due to the low sex ratio at birth (Chandramouli, 2012). As Guilmoto and Duthé put it, outside of "a freak biological phenomenon that alters the sex ratio at birth" (p. 2), human meddling (preconception or sex-selective abortion) is the only explanation for an imbalanced sex ratio at birth. In the likely absence of sophisticated preconception methods to ensure conception of the desired sex (Madan & Breuning), we are left with sex-selective abortion in the context of son preference as the most plausible explanation for a distorted sex ratio at birth (Echávarri & Ezcurra, 2010). We believe that in this study, it is occurring in the community before mothers ever present to the mission hospital for care.

The convergence of culture, son preference, and reproductive technology are complex issues of gender discrimination resulting in skewed sex ratios with lower than expected numbers of females (Agrawal, 2012). The worsening gender discrimination, evidenced by the trend in sex ratio, can only be reversed through social change. Nurses are critical in addressing this complex issue. Public policy alone has failed. Nongovernmental organization (NGO) and other organizational schemes have failed. As noted by Rajaram and Zararia (2009), *rights* in law books must cross over to *rights* perpetuated by social norms within local communities, in order to positively impact the lives of poor women. The mission hospital has begun sending nurses out into the villages to engage in community health nursing. By addressing the needs of the individual within the realities of their social context, effective change is possible.

Ministering to human needs, following the teachings of Jesus Christ and his loving example, makes Christian nurses effective change agents. Nurses could develop and pilot test interventions aimed at comprehensively addressing gender discrimination by working with and empowering women, and providing outreach and interventions to families to protect female fetuses, infants, children, and adults. Such interventions have positive effects on the mental health and well-being of women who suffer with anxiety and depression as a result of discriminatory cultural practices. Social change is a very slow process, but meanwhile, Christian nurses on the frontline can provide compassionate care until the women are empowered enough to change this or stand up to discrimination.

CONCLUSION

A major strength of this study is the inclusion of longitudinal data. Two concurrent years of detailed birth records were analyzed, and aggregate data on sex ratio at birth were analyzed for a 12-year trend. These analyses highlight the distorted sex ratio that had gone unrecognized in this setting, and awareness may serve as a first step in addressing this issue. An additional strength is the use of qualitative methods that supported face validity of data interpretation and pointed to realities that would have been challenging to assess in a quantitative survey, due to associated stigma.

Data collection and analysis were limited to extraction from available medical records with some missing data, approximation of women's ages, and retrospective analysis. Additionally, although the results reflect cultural norms in India, the results are not generalizable to all people of India, due to variation across regions.

This medical records review revealed low birth weight babies and a distorted sex ratio at birth, which point to female discrimination and son preference. Additional findings, such as the link between the higher parity and distorted sex ratios, reflect the continued concern that despite policies to the contrary, India continues to experience significant gender discrimination. Christian nurses at the bedside, as well as reaching out to the community in this predominantly Hindu area, have the opportunity to display the love and healing power of Jesus Christ, while effecting social change.

Similarly, Christian nurses in other settings must consider the influence of cultural context to understand social issues faced by their patients and community. Thinking through patient situations in this manner prepares nurses to better meet the needs of those for whom they care.

Acknowledgments

The authors would like to thank Loma Linda University School of Nursing, which provided seed funds for this project.

References

- Agrawal S. The sociocultural context of family size preference, ideal sex composition, and induced abortion in India: Findings from India's National Family Health Surveys. *Health Care for Women International*. 2012; 33(11):986–1019. DOI: 10.1080/07399332.2012.692413 [PubMed: 23066963]
- Bassani DG, Kumar R, Awasthi S, Morris SK, Paul VK, Shet A, ... Jha P. Causes of neonatal and child mortality in India: A nationally representative mortality survey. *Lancet*. 2010; 376(9755):1853–1860. DOI: 10.1016/S0140-6736(10)61461-4 [PubMed: 21075444]
- Basu A. Harmful practices against women in India: An examination of selected legislative responses. United Nations (May 2009). 2009:2–19.
- Berg, BL. *Qualitative research methods for the social sciences*. Boston: Allyn and Bacon; 2009.
- Bharadwaj P, Lakdawala LK. Discrimination begins in the womb. *Journal of Human Resources*. 2013; 48(1):71–113.
- Central Intelligence Agency. CIA factbook: South Asia: India. *The World Factbook*. 2013. Retrieved from <http://www.cia.gov/library/publications/the-world-factbook/geos/in.html>
- Chamraborty R, Ranger M. A multinomial model of fertility choice and offspring sex ratios in India. *The Journal of Development Studies*. 2010; 46(3):417–438.
- Chandramouli, C. Child sex ratio in India. 2012. Retrieved from http://www.actionaid.org/sites/files/actionaid/child_sex_ratio_-_presentation_by_census_commissioner.pdf
- Chor J, Patil K, Goudar S, Kodkany B, Geller S. Provider insights on barriers and opportunities for birth spacing utilization in Karnataka, India. *Health Care for Women International*. 2012; 33(11):1035–1045. DOI: 10.1080/07399332.2012.700972 [PubMed: 23066965]
- Corbin, JM., Strauss, AL. *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Los Angeles, CA: Sage; 2008.
- Croll, E. *Endangered daughters: Discrimination and development in Asia*. London, UK: Routledge; 2000.
- Das Gupta M, Jiang Z, Li B, Xie Z, Woojin C, Bae H. Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea. *Journal of Development Studies*. 2003; 40(2):153–187.
- Echávarri RA, Ezcurra R. Education and gender bias in the sex ratio at birth: Evidence from India. *Demography*. 2010; 47(1):249–268. [PubMed: 20355693]
- Government of India. 2011 Census Data. *Census of India: Our Census, Our Future*. 2013. Retrieved from http://www.censusindia.gov.in/2011-prov-results/paper2-vol2/prov_results_paper2_indiavol2.html
- Guilmoto CZ. Skewed sex ratios at birth and future marriage squeeze in China and India, 2005–2100. *Demography*. 2012; 49(1):77–100. DOI: 10.1007/s13524-011-0083-7 [PubMed: 22180130]
- Guilmoto C, Duthé G. Masculinization of births in Eastern Europe. *Population & Societies -Month ly bulletin of the French National Institute for Demographic Studies*. 2013 Dec.506:1–4.
- Hedge RS. Marking bodies, reproducing violence: A feminist reading of female infanticide in South India. *Violence Against Women*. 1999; 5(5):18.
- Hong JS, Yi SW, Han YJ, Park YW, Nam CM, Kang HC, Ohrr H. Fetal growth and neonatal mortality in Korea. *Paediatric & Perinatal Epidemiology*. 2007; 21(5):14.doi: 10.1111/j.1365-3016.2007.00850.x

- Jha P, Kesler MA, Kumar R, Ram F, Ram U, Aleksandrowicz L, ... Banthia JK. Trends in selective abortions of girls in India: Analysis of nationally representative birth histories from 1990 to 2005 and census data from 1991 to 2011. *Lancet*. 2011; 377(9781):1921–1928. DOI: 10.1016/S0140-6736(11)60649-1 [PubMed: 21612820]
- Joshi A, Tiwari N. Sex ratio in India-Embarrassing to be honest. *Current Science (Bangalore)*. 2011; 101(8):1006–1008.
- Last, John M., editor. *A dictionary of epidemiology*. 4. New York, NY: Oxford; 2001.
- Madan K, Breuning MH. Impact of prenatal technologies on the sex ratio in India: An overview. *Genetics in Medicine*. 2014; 16(6):425–432. [PubMed: 24177057]
- Magnier, M. It's not exactly the Mayo Clinic. *Los Angeles Times*. 2013. Retrieved from <http://www.latimes.com/news/nationworld/world/la-fg-india-rural-health-20130327,0,3456175.story>
- Manchanda S, Saikia B, Gupta N, Chowdhary S, Puliye JM. Sex ratio at birth in India, its relation to birth order, sex of previous children and use of indigenous medicine. *PLoS One*. 2011; 6(6):e20097. [PubMed: 21697990]
- Orr, RD. *Medical ethics and the faith factor: A handbook for clergy and health-care professionals*. Grand Rapids, MI: Eerdmans; 2009.
- Patton, MQ. *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage; 2002.
- Paul VK, Sachdev HS, Mavalankar D, Ramachandran P, Sankar MJ, Bhandari N, ... Kirkwood B. Reproductive health, and child health and nutrition in India: Meeting the challenge. *Lancet (London, England)*. 2011; 377(9762):332–349.
- Pence, GE. *Medical ethics: Accounts of the cases that shaped and define medical ethics*. New York, NY: McGraw-Hill Ryerson; 2007.
- Pham BN, Hall W, Hill PS. Indirect evidence of the contribution of prenatal sex selection practices to the high sex ratio at birth in Vietnam. *Journal of Population Research*. 2011; 28(4):293–299. DOI: 10.1007/212546-011-9068-z
- Puri S, Adams V, Ivey S, Nachtigall RD. “There is such a thing as too many daughters, but not too many sons”: A qualitative study of son preference and fetal sex selection among Indian immigrants in the United States. *Social Science & Medicine*. 2011; 72(7):1169–1176. DOI: 10.1016/j.socscimed.2011.01.027 [PubMed: 21377778]
- Rajaram N, Zararia V. Translating women's human rights in a globalizing world: The spiral process in reducing gender injustice in Baroda, India. *Global Networks*. 2009; 9(4):462–484. DOI: 10.1111/j.1471-0374.2009.00264.x
- Roberts LR, Anderson BA, Lee JW, Montgomery S. Grief and women: Stillbirth in the social context of India. *International Journal of Childbirth*. 2012; 2(3):12.doi: 10.1891/2156-5287.2.3.187
- Sahni M, Verma N, Narula D, Varghese RM, Sreenivas V, Puliye JM. Missing girls in India: Infanticide, feticide and made-to-order pregnancies? Insights from hospital-based sex-ratio-at-birth over the last century. *PLoS One*. 2008; 3(5):e2224.doi: 10.1371/journal.pone.0002224 [PubMed: 18493614]
- Sawyer CC. Child mortality estimation: Estimating sex differences in childhood mortality since the 1970s. *PLoS Medicine*. 2012; 9(8):e1001287. [PubMed: 22952433]
- Scherb H, Kusmierz R, Voigt K. Increased sex ratio in Russia and Cuba after Chernobyl: A radiological hypothesis. *Environmental Health*. 2013; 12(1):63. [PubMed: 23947741]
- Sev'er A. Discarded daughters: The patriarchal grip, dowry deaths, sex ratio imbalances & foeticide in India. *Women's Health & Urban Life*. 2008; 7(1):56–75.
- Singh JP. Socio-cultural aspects of the high masculinity ratio in India. *Journal of Asian and African Studies*. 2010; 45(6):628–644. DOI: 10.1177/0021909610373903 [PubMed: 21174876]
- Tashakkori, A., Teddlie, C. *Handbook of mixed methods in social & behavioral research*. Thousand Oaks, CA: Sage; 2003.
- UN Women. Sex ratios and gender biased sex selection: History, debates and future directions. New Delhi, India: UN Women Multi-Country Office for India, Bhutan, Maldives & Sri Lanka; 2014. p. iv-60.

Web Resources

- It's a Girl—<http://www.itsagirlmovie.com>
- 50 Million Missing Campaign—<https://50millionmissing.wordpress.com>
- Child Sex Ratio in India—http://www.actionaid.org/sites/files/actionaid/child_sex_ratio_-_presentation_by_census_commissioner.pdf

Figure 1. Twelve-Year Trend of Female-to-Male Sex Ratio at Birth at 100-Bed, Rural Mission Hospital in India*

*Ratio calculated on the number of females per 1,000 males

Table 1

Delivery Data at 100-Bed, Rural Mission Hospital in India

	2010	2011
Babies:	<i>N (%)</i>	<i>N (%)</i>
Deliveries	536	563
Total Births	552	576
Twins	16 (2.9)	12 (2.0)
Triplets	0	1
Stillbirths ^{<i>I</i>}	57 (10.3)	68 (11.8)
Females	223 (40.4)	259 (45.0)
Males	322 (58.3)	316 (55.0)
Gender not recorded	7	0
Mothers:		
Age Range of Mothers ^{<i>a</i>}	18–40	18–42
Mean Age of Mothers ^{<i>a</i>}	24.18	24.32
Number of Pregnancies	1–11	1–10
Primigravida Mothers	244 (45.5)	282 (50.1)
Unbooked ^{<i>b</i>}	480 (89.5)	504 (89.5)
General Ward	357 (66.6)	418 (74.2)
Private Room	179 (33.4)	145 (25.8)
C-section	330 (59.7)	330 (58.6)

^{*I*} Stillbirth rate is typically reported as the number of stillbirths per 1,000 live births. If we were to extrapolate, the rates would be 103 and 118 in 2010 and 2011, respectively; however, we have reported the percentage of stillbirths of the exact number of births for each year at this particular hospital.

^{*a*} Recorded age per medical records; however, it should be noted that medical personnel reported that the women often do not know their age. In such cases, the medical personnel record an estimated age, based on appearance, number of pregnancies, relatives' estimate, recalled events, or a combination of these factors. Estimated versus actual age was not designated on the medical records; therefore, for the purpose of this study, mothers' age data are estimated only.

^{*b*} Unbooked status indicates that the mother was not preregistered for delivery at the hospital.

Note: In 2010, general ward or private room was not designated on 2.9% of the records.

Table 2

Weights for Live Births at 100-Bed, Rural Mission Hospital in India

	2010 ^a (N = 552)			2011 ^a (N = 575)	X ² or t	
Lowest Weight	980			960		
Highest Weight	4400			3740		
Average Weight	2639.6			2568.6	2.028 *	
Low Birth Weight ^b	38.1%			39.7%	.897	
		t	95% CI		t	95% CI
Average Weight (SD)						
Female	2567.8 (526.9)	2.48 *	25.30, 219.8	2517.6 (501.4)	2.16 *	9.2, 192.4
Male	2690.3 (546.1)			2618.4 (538.8)		
Average Weight - General Ward (SD)						
Female	2580.1 (525.9)	1.19	-48.28, 196.06	2480.2 (511.3)	2.19 *	12.2, 228.7
Male	2654.0 (529.3)			2600.7 (532.5)		
Average Weight - Private Room (SD)						
Female	2615.7 (501.2)	2.56 *	46.28, 358.73	2673.3 (388.1)	0.81	-91.9, 220.1
Male	2818.2 (521.5)			2737.4 (494.3)		
All Babies ^d						
General Ward	2627.0 (527.6)	-1.98 *	-197.3, 0.52	2543.8 (525.3)	-3.26 **	-266.9, -66.1
Private Room	2725.9 (520.7)			2710.4 (452.1)		

Note: All weights reported in grams.

^a Females and males combined,^b weight 2,500 grams.* $p < .05$,** $p < .01$, two-tailed.

Table 3

Female-to-Male Sex Ratios at Birth at 100-Bed, Rural Mission Hospital in India *

	2010	2011
Total	0.69	0.82
Primigravida	0.69	0.82
Multigravida	0.64	0.81
C-Section	0.61	0.76
Vaginal (with or without forceps)	0.80	0.90
Booked ^a	0.67	0.79
Unbooked ^b	0.67	0.82
General Ward	0.59	0.84
Private Room	0.88	0.74

* Ratio calculated on the number of females per 1,000 males

^aPreregistered for delivery at the hospital.

^bArrived for delivery without preregistration.