Draft Paper

Ultrasound Testing during Pregnancy and Abortion among the Urban Poor in Three Cities of India

Abstract

The present paper is an attempt to examine the use and timing of ultrasound testing during pregnancy and abortion for women who had ultrasound testing during pregnancy. The analysis is based on 4,346 pregnancies to interviewed women in the survey on Health of the Urban Poor. Analysis reveals that an ultrasound test in the last abortion was conducted for 56 percent of pregnancies, but differentials exist by socio-demographic characteristics of mother and it leads to abortions. The proportion of women who ever experienced abortion is slightly higher among those living in slums than among non-slums. Ultrasound testing during pregnancy has strong positive relationship with the mother's education and standard of living index of the household, the relationship is even stronger for women with two children and women with three or more children. The less educated women are significantly more likely to have an abortion in case of one surviving child.

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INTRODUCTION

Abortion is a serious problem in several developing countries including India due to high maternal mortality from complications of abortion. Abortion is a complex issue due to the interface of cultural attitudes, prejudices, and modern technology. Worldwide, abortion represents an important aspect of women's reproductive health and rights. The estimated annual number of abortions in Asia increased slightly from 25.9 million in 2003 to 27.3 million in 2008. The majority of these abortions occurred in South Central Asia (10 .5 million), which includes India, and Eastern Asia (10.2 million), which includes China in 2008. India recorded the 6.5 million of the total 10.5 million abortions that took place in the region (south and central Asia), of which 66% or two-thirds were deemed unsafe. The World Health Organization estimates that in Asia, 12 percent of all maternal deaths (17,000) were due to unsafe abortion in 2008 (World Health Organization, 2011). Although unsafe abortions are preventable, they continue to pose undue risks to a woman's health and may endanger her life. Abortion has been legal in India for over 40 years following the enactment of the Medical Termination of Pregnancy (MTP) Act in 1971. The MTP Act came into effect from April 1, 1972 permits abortion for a broad range of social and medical reasons, including pregnancy carries the risk of grave physical injury, endangers her mental health, is the result of contraceptive failure (in case of a married woman) or rape, or is likely to produce a child with physical or mental abnormalities (Ministry of Health and Family Welfare, 2003). Despite the intensive national campaign for safe motherhood and legalization of induced abortion that took place in India long ago, morbidity from abortion has remained a serious problem for Indian women (Johnston, 2002).

According to Indian government data the number of ultrasound machines manufactured in India increased rapidly between 1988 and 2003 with an especially marked increase after 1994 (George, 2006). The National Family Health Survey (NFHS-2) conducted in 1998-99 was the first survey in India to collect nationwide data on the use of ultrasound and amniocentesis during pregnancies (International Institute for Population Sciences and ORC Macro, 2000). The liberalization of the Indian economy in the 1990s made prenatal ultrasound technology affordable and available to a large fraction of the population. As a result, ultrasound use amongst pregnant women rose dramatically in many parts of India (Mevlude and Rosenblum, 2012). Recent research attributes the rise in sex-selection in India to the introduction of ultrasound as a relatively cheap and safe way to determine the sex of a fetus (Arnold et al., 2002; Bhalotra and Cochrane, 2010).

Sources of data on induced abortion in India somehow fail to provide consistent estimates of induced abortions in India (Ganatra, 2000; Khan et al., 1998), but most researchers using direct and indirect methods of estimation seem to agree that there are between five and seven million induced abortions per year (Chhabra, 1996; Chhabra and Nuna, 1994 and Coyaji, 2000). A community-based study in western Maharashtra interviewed 1,409 women who underwent induced abortion during 1996-98 and found that 18 percent of these abortions were for averting the birth of female babies (Ganatra, Hirve, and Rao, 2001). Based on National Family Health Survey conducted in 1998-99, Mari Bhat and Francis Zavier (2007) estimated that 6 percent of female fetuses were aborted after a prenatal diagnostic test. However, they estimated that the

proportion could be as high as 17 percent when possible underreporting is taken into account. Arnold and Parasuraman (2009) examine the relationship between reported ultrasound use and pregnancy outcomes by using Indian National Family Health Survey conducted in 2005-06. They have shown positive correlation between a mother's individual ultrasound use and the probability a child is born male. Research has also confirmed high levels of sex-selective abortions in India, causing an estimated half a million missing women in India per year (Jha et al., 2006, 2011; Bhalotra and Cochrane, 2010).

The strong preference for sons has created a market for methods to determine the sex of fetuses. The easy availability of ultrasound testing for pregnant women in India during the last two decades has facilitated the expansion of sex-selective abortion, although there are some indications that son preference is beginning to lose its grip at least in parts of the country (Das Gupta, Chung, and Shuzhou, 2009; International Institute for Population Sciences and Macro International, 2007). The recent rapid spread of ultrasound in India did not cause a concomitant rise in sex-selection. The ultrasound has been increasingly used for health care rather than sex selection in India in the 2000s (Mevlude and Rosenblum, 2012). Adolescents among the urban and rural poor have a high incidence of chronic energy deficiency (CED) and anaemia, more so in girls than in boys. Adolescent pregnancies (15-19 years) contribute to 19% of total fertility in India and record the highest maternal mortality rates. Besides maternal age, lack of education, low socio-economic status, maternal under nutrition and limited access to maternal health services are important determinants of poor pregnancy outcomes (Mehra and Agrawal, 2004). Given the fact that women in India have little control over their own fertility and also have poor health, the chances are very high that they may experience abortion, which includes both spontaneous and induced abortion, and perhaps more than once (Babu et al., 1998). The pressure to have sons has intensified in India, as couples strive simultaneously to reduce family size and ensure the birth of the desired number of sons, leading to increased acceptance of and reliance on the use of sex selection strategies to achieve those results. The use of coercive measures in implementing population policies—particularly undue emphasis on the use of permanent methods—can easily lead to an intensifying trend toward sex determination and sex-selective abortion (Mallik, 2002).

There is limited formal evidence on the effects of the continued spread of ultrasound technology on missing women in India. On the one hand, ultrasound can be misused for sex-selective abortion, exacerbating the already skewed sex-ratio in India. On the other hand, ultrasound technology has legitimate medical benefits that may lead to general improvements in child and maternal health. Thus, it is relevant to public health policy to identify whether there is a significant negative consequence of the increasing availability of ultrasound and to quantify such an effect if it exists (Mevlude and Rosenblum, 2012). The socio-economic, demographic and public health importance of abortion in India requires a more thorough understanding of the factors associated with it. More studies on sonography has mainly concentrate on the declining sex ratio, sex-selective abortion, the proliferation of abortion clinics in urban areas, maternal and child health care and on the demographic profiles of women. According to the Pre-natal Diagnostics Techniques (Regulation and Prevention of Misuse) Act which came into force in 1996, conducting ultrasound tests to reveal the sex of a foetus is illegal but it has been remarkably ineffective in controlling the practice.

Not much is known about the sonography during pregnancy and abortion in socioeconomic and demographic context. There are very few studies on ultrasound testing during pregnancy and pregnancy outcome due to limited availability of reliable information on the extent of ultrasound testing during pregnancy, the characteristics of pregnant women who undergo

ultrasound testing, and the use of ultrasound for pregnancy termination. Therefore, this study uses more recent data from the survey on Health of the Urban Poor in three Cities: Bhubaneswar, Jaipur and Pune to examine the use and timing of sonography during pregnancy and abortion for women who had sonography during pregnancy and those who did not. The analysis also explores the determinants of sonography and abortion.

DATA AND METHODS

Data

The analysis is based on representative data from survey on Health of the Urban Poor (HUP) in Three Cities: Bhubaneswar, Jaipur and Pune conducted in 2011. We examined a sample of 4351 women (1322 women in Bhubaneswar, 1613 in Jaipur and 1416 in Pune) in the age group of 15–49 years in 5,718 households. The analysis in this paper is based on 4,346 pregnancies to interviewed women in the three years preceding the survey.

The analysis has been done by using bivariate and multivariate logistic regression analysis. We have also tried to identify the socio-demographic factors that influence the ultrasound testing and pregnancy outcome among urban poor women. The bivariate and multivariate logistic regression was used to analyze the strength of association between ultrasound testing and pregnancy outcome and relevant socio-demographic factors. An attempt has been made with the help of multivariate logistic regression analysis to explore the factors influencing the ultrasound testing and pregnancy outcome in Bhubaneswar, Jaipur and Pune.

ANALYSIS

For each pregnancy, women in HUP survey were asked whether the pregnancy ended in a live birth or a non-live birth (miscarried/aborted/still birth), whether the woman had an ultrasound test at any time during the pregnancy. In this paper, the use of ultrasound and pregnancy outcome after an ultrasound test are examined in relation to a variety of demographic and socioeconomic variables including age, education, religion, caste/tribe, media exposure, standard of living index and type of locality at the time of the pregnancy. The data are analyzed using both descriptive statistics and multivariate logistic regression methods. The logistic regression models for the use of ultrasound during pregnancy and pregnancy outcome following an ultrasound test were estimated using SPSS.

RESULTS

Use of Ultrasound

Table 1 presents the percentage of women reporting ultrasound test in the last abortion any time during three years prior to the survey and percent distribution of women who ever experienced abortion and experienced at least one abortion in last three years according to background characteristics in three cities of India. An ultrasound test in the last abortion was conducted for 56 percent of pregnancies in the three years preceding the survey, but the differentials exist by socio-demographic characteristics in three cities of India. The use of

ultrasound was highest for younger mothers who were 15-24 years old at the time of pregnancy (64%) than those age 25-34 years old (56%) and for mothers age 35-49 at the time of pregnancy (41%) in three cities of India.

The use of ultrasound in the last abortion increases dramatically with the mother's level of education and the standard of living index in three cities of India. The use of ultrasound rises consistently from only 41 percent for women with less than 5 years of education to 64 percent for women with 10 or more years of education. Ultrasound testing varies from 46 percent of pregnancies to women belonging to the low standard of living index to 65 percent of pregnancies to women belonging to the high standard of living index in three cities of India. The use of ultrasound testing in the last abortion is varies from lowest 50 percent among Muslims, followed by 56 percent of women among Hindus to the highest 60 percent of women who do not belong to Hindu, Muslim and Christian religions. Overall, women from disadvantaged caste/tribe groups in all the three cities are much less likely than women from other groups to have ultrasound testing during pregnancy. Forty-five percent of women among scheduled castes/scheduled tribes (SC/ST), and 54 percent of women among other backward classes (OBC) had an ultrasound test during their pregnancies, compared with 62 percent of women who do not belong to any of these groups.

The use of ultrasound testing in the last abortion increases sharply with exposure to mass media, from 50 percent of the woman who had no exposure to mass media to 60 percent of the woman who had full exposure to mass media. The use of ultrasound testing is higher in slum areas (58%) than in non-slum areas (49%). There are substantial differences in the use of ultrasound test in last abortion by cities, varies from lowest 37 percent of women in Bhubaneswar to 55 percent of women in Jaipur and highest 67 percent of women in Pune.

Ever Abortions and Abortions in last three years

For every pregnancy in the last three years, women in HUP survey were asked whether the pregnancy ended in a live birth or a non-live birth (miscarriage, an induced abortion, or a stillbirth). Fourteen percent of women ever experienced abortion and 27 percent of women experienced abortion in last three years in three cities of India (Table 1). The women (age 25-34 years) had the highest level of ever abortions (16 %) than older women in age 35-49 years (13 %) and younger women 15-24 years (11 %) but the women had experienced abortion in the last three years is highest 75 percent among younger women (age 15-24 years), followed by 37 percent in age 25-34 years and lowest 5 percent among older women (age 35-49 years). The women who ever experienced abortions were high for women with 5-9 years of education, for women who belong to OBC and SC/ST and for women in the medium standard of living index whereas the women who experienced abortion in last three years were high for women with 5-9 years of education, for women who belong to SC/ST and for women in the low standard of living index. The women who ever experienced abortions slightly increase from 14 percent for women with less than 5 years of education to 15 percent for women with 5-9 years of education and decrease to 14 percent in case of women with 10 or more years of education. Similarly, the women who experienced abortion in last three years increase from 24 percent for women with less than 5 years of education to 28 percent each for women with 5-9 years of education and women with 10 or more years of education. The women who ever experienced abortion varies from the lowest 12 percent of women belonging in the high standard of living index to 16 percent of women belonging in the medium standard of living index but the women who experienced abortion in last three years consistently declined from the highest 31 percent of women belonging in the low standard of living index to 19 percent of women belonging in the

low standard of living index. The women who ever experienced abortion is vary from the lowest 13 percent of women among Christians to 14 percent among Hindus and the highest 19 percent among women who do not belong to Hindus, Muslims and Christians. But the women who experienced abortion in last three years is ranging between the lowest 20 percent of women among Christians to the highest 36 percent of women among Muslims. Overall, women from disadvantaged caste/tribe groups in three cities are less likely to had experience of ever abortion and more likely to had experience of abortion in last three years than women from other groups. Fourteen percent of women from scheduled castes/scheduled tribes, had ever experienced abortion, compared with 16 percent of women among OBC and 13 percent of women who do not belong to any of these groups. On contrary, 29 percent of women from scheduled castes/scheduled tribes had experienced abortion in the last three years than 24 percent of women among OBC and 28 percent of women who do not belong to any of these groups.

The women who had ever experienced abortion by mass media exposure is lowest 12 percent in case of women who had full exposure to mass media and highest 14 percent each in case of women who had no exposure to mass media and were having partial exposure to mass media. On contrary, women who had experienced abortion in last three years increases with mass media exposure, from the lowest 13 percent in case of women who had no exposure to mass media to 27 percent of women who had partial exposure to mass media to the highest 33 percent of women who had full exposure to mass media. The women who had ever experienced abortion and experienced abortion in the last three years are slightly higher in non-slum areas (15 % and 29 %) than slum areas (14 % and 27 %) respectively. The women who had ever experienced abortion and the women who had experienced abortion in last three years vary from the lowest 9 percent and 22 percent in Bhubaneswar to the highest 19 percent and 30 percent in Jaipur respectively. This indicates that there is an urgent need for the country's family planning programme to spread awareness for safe abortions and also sincere efforts to increase use of contraception and use of safe abortion services.

Use of Ultrasound and Abortion in Last Pregnancy

All women who were pregnant in the last three years preceding the survey were asked whether ultrasound test conducted during last pregnancy and whether they had a pregnancy that was aborted during 3 years prior to survey. Table 2 shows the percentage of women reporting an ultrasound test conducted in the last pregnancy any time during three years prior to the HUP survey and percentage of the last pregnancy with an ultrasound test that were aborted during 3 years prior to survey according to background characteristics in three cities of India. Seventy-three percent of the women reported use of ultrasound testing during last pregnancy. About three-fourths of women reported that an ultrasound test was conducted in the last pregnancy any time during 3 years prior to the survey, but there are considerable differentials by cities, socio-economic and demographic characteristics.

The women reporting an ultrasound test conducted in the last pregnancy any time during three years prior to survey by age are higher 80 percent in age group 25-34 years than 66 percent among younger women in the age group 15-24 years. The use of ultrasound in last pregnancy

increases dramatically with the mother's level of education and the standard of living index. The use of ultrasound rises consistently from 49 percent for women with less than 5 years of education to 87 percent for women with 10 or more years of education. Ultrasound testing during last pregnancy varies from 56 percent of women belonging in the low standard of living index to 94 percent of women belonging in the high standard of living index. The use of ultrasound testing in last pregnancy is lowest for Hindus (71 percent), followed by Muslims (78 percent) but much higher for women who do not belong to Hindus, Muslims and Christians (100 percent). Women from disadvantaged caste/tribe groups are much less likely than women from other groups to have ultrasound testing during last pregnancy. Sixty-four percent of women from scheduled castes/scheduled tribes had an ultrasound test during their last pregnancies, compared with 68 percent of women from other backward classes, and 81 percent of women who do not belong to any of these groups. The use of ultrasound testing during last pregnancy increases sharply with mass media exposure, from 43 percent if the woman had no exposure to mass media to 86 percent if the woman had full exposure to mass media. The use of ultrasound in the last pregnancy is much higher in slum areas (77 percent) than in non-slum areas (60 percent). The use of ultrasound in the last pregnancy is varies within cities, from the lowest 65 percent in Jaipur to the highest 81 percent in Pune.

Thirty-seven percent of women with an ultrasound test in their last pregnancies aborted their last pregnancy in the last three years in three cities of India. Younger women (age 15-24) had the higher level of abortion in their last pregnancy with an ultrasound test (40 percent) than 39 percent in age group 25-34 years. Abortions in last pregnancies with an ultrasound test were lowest for women with less than 5 years of education, for women in the low standard of living index, and for women from scheduled castes/scheduled tribes. Abortions in last pregnancies with an ultrasound test increase monotonically from 28 percent for women with less than 5 years of education to 43 percent for women with more than 10 years of education. Abortions with an ultrasound test in last pregnancy were highest 43 percent for women belonging to medium standard of living index than the lowest 30 percent for women belonging to low standard of living index. Abortions with an ultrasound test in last pregnancy were highest 80 percent for other religions including Sikhs and Buddhists/Neo-Buddhists than the lowest 29 percent of women among Muslims. The women from other castes excluding SC/ST and OBC had experienced the highest 40 percent of abortions in their last pregnancies with an ultrasound test than the lowest 32 percent of women among SC/ST. The women who experienced abortions in their last pregnancy with an ultrasound test were higher 40 percent in case of women who had full exposure to mass media than women who had partial exposure to mass media. The women in slum areas (41 %) were two times more likely to abort their last pregnancies with an ultrasound test than women in non-slum areas (22 %). This result suggests a reluctance to abort a pregnancy with an ultrasound test is more in slum areas than non-slum areas. It varies within cities from the lowest 24 percent in Jaipur to the highest 53 percent in Pune.

Timing of ultrasound testing

For current pregnancy in the last three years, HUP survey asked whether an ultrasound test was performed at any time during the current pregnancy and how many months pregnant the woman was when the ultrasound test was done. However, some information about the timing of ultrasound tests can be obtained by analyzing the ultrasound experience of currently pregnant women according to their month of pregnancy. Table 3 shows the percentage of current pregnancies for which an ultrasound test was done by the number of months pregnant. Overall, 0-6 percent of women in their first three months of pregnancy have already had an ultrasound test. The proportion rises to 18-22 percent at 4-5 months of pregnancy, 12 percent in the sixth month of pregnancy. By the seventh month of pregnancy, ultrasound testing reaches 15 percent in three cities of India. Abortions are currently legal in India up to only 20 weeks of gestation. Based on the HUP survey data on ultrasound testing for currently pregnant women by month of pregnancy, only 51 percent of ultrasound tests are done that early in the pregnancy. This suggests that nearly half of ultrasound tests in three cities of India are conducted too late in the pregnancy to qualify for a legal abortion. Although most abortions performed in India are thought to be illegal (Caldwell and Caldwell, 2003), illegal abortions after 5-6 months of pregnancy are not likely to be common. Therefore, it is evident that ultrasound tests after five months of pregnancy are overwhelmingly for diagnostic purposes and not for sex selection. Moreover, the percentage of women in the first three months of pregnancy who received an ultrasound test is 11 percent of pregnancies, 52 percent of pregnancies in the fourth to sixth months and 36 percent in the seventh to ninth month who were tested (Figure 1).

MULTIVARIATE ANALYSIS

The results of multivariate analyses of the determinants of the use of ultrasound testing during pregnancy is depicted in Table 4 and Table 5 shows the regression results for the abortion. The background characteristics in both tables that are included in the regressions as potential confounders are age of women, the mother's level of education, the mother's religion, the mother's caste/tribe, media exposure, the standard of living index, and type of locality. The regressions were run for women with one living child, two living children, and three or more living children at the time of the pregnancy.

Table 4 shows that older women with one surviving child are more likely to go for ultrasound testing than younger women but older women with two or three children are much less likely to go for ultrasound testing than younger women in three cities. The women with two or more than three surviving children in non-slum areas are much less likely to go for ultrasound testing than in slum areas. There is no significant relationship between religion and ultrasound testing in almost all cases except in case of Muslims having 3 and more surviving children, but caste/tribe is significantly related to ultrasound testing for women with two children in case of other castes. Ultrasound testing for women with one child is least prevalent among Other Backward Class (OBC) and women who are not members of scheduled castes or scheduled tribes or OBC as compared to women among scheduled castes or scheduled tribes. Ultrasound testing for women with two children is most prevalent for women who are not members of scheduled castes or scheduled tribes or OBC than scheduled castes/scheduled tribes and OBC women. Ultrasound testing during pregnancy has a strong positive relationship with the mother's education and the standard of living index of the household. The women with more than 10 years of education are significantly more likely to go for ultrasound testing compared to less than 5 years educated women. Women with 10 or more years of education are typically

about 2-3 times as likely to get an ultrasound test as women with less than 5 years of education. First-parity women in the highest standard of living index are 1.5 times as likely as women in the low standard of living to have an ultrasound test. The relationship is even stronger for women with two children (OR=1.8) and women with three or more children (OR=2.9). The regressions show a consistent positive effect of higher standard of living index on ultrasound testing. Age is a significant factor only for first-parity women.

For women who underwent an ultrasound test during pregnancy and had an abortion, the abortion after ultrasound test provides crucial information about the abortions. Table 5 examines the factors related to having an abortion after an ultrasound test. The regression analyses do not identify any confounding characteristics that have a consistent significant association with the ultrasound tests. However, all of the odds ratios for those with Muslim and Christian religion are higher than Hindu in case of one surviving child. The women with 5 to 9 years of education and 10 years and more educated women are significantly less likely to have an abortion in case of one surviving child but it increases in case of two and three and more surviving children (OR=1.4 for 5 to 9 years of education in case of two surviving children and 1.4 for 10 and more years of education in case of three surviving children. At the first parity, women in the slum areas are significantly 1.5 times as likely to have an abortion than women in non-slum areas. Even in the non-slum areas, women with two, three and more surviving children more likely to have an abortion after ultrasound test during pregnancy than women in slum areas.

CONCLUSIONS

The Health of the Urban Poor Survey (HUP) provides a source of data for studying the use and timing of ultrasound testing during pregnancy and pregnancy outcomes for women who had an ultrasound test and those who did not have an ultrasound test during their pregnancies in the last three years. The data provide a unique opportunity to produce quantitative estimates of the extent to which ultrasound tests are conducted followed by abortions. While the analysis confirms the importance of ultrasound test in making decisions about an abortion. Fifty-six percent of women in three cities of India reporting an ultrasound test in the last abortion any time during three years prior to survey, 14 percent of women ever experienced abortion and 27 percent of women experienced abortion at least one abortion in last three years. Twenty-seven percent of women experienced abortion in the last three years. Seventy-three percent of pregnant women in three cities of India have an ultrasound test in the last pregnancy, and 52.6 percent of those last pregnancies with an ultrasound tests result in abortions. Twenty-seven percent of women experienced abortion in the last three years. More than half of the women reported that they have had an ultrasound test during 4 to 6 months of current pregnancy.

Ultrasound testing during pregnancy has a strong positive relationship with the mother's education and the standard of living index of the household, the relationship is even stronger for women with two children (OR=1.8) and women with three or more children. The less educated women are significantly more likely to have an abortion in case of one surviving child. The analysis shows the use of ultrasound tests for abortion of pregnancy. Therefore, government may take strict action against those hospitals which are conducting ultrasound tests for abortions of pregnancy and stringent enforcement of existing laws that prohibit the use of ultrasound tests for abortions during pregnancy

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References

Arnold, Fred and Sulabha Parasuraman, "The Effect of Ultrasound Testing during Pregnancy on Pregnancy Termination and the Sex Ratio at Birth in India," 2009. Paper presented at the XXVI International Population Conference, International Union for the Scientific Study of Population, Marrakech, 27 September-2 October.

Arnold, F., S. Kishor, and T.K. Roy. 2002. Sex-selective abortions in India. Population and Development Review 28(4): 759-785.

Babu, N. P., D. Nidhi, and R.K. Verma. 1998. Abortion in India: What does the National Family Health Survey tell us? Journal of Family Welfare 44: 45-54.

Bhalotra, Sonia and Tom Cochrane, "Where Have All the Young Girls Gone? Identification of Sex Selection in India," IZA Discussion Paper, 2010, 5381.

Chhabra, R. 1996. Abortion in India: An overview. Demography India 25: 83-92.

Chhabra, R, S.C. Nuna. 1994. Abortion in India—An overview. Delhi: Ford Foundation.

Coyaji, K. 2000. Early medical abortion in India: Three studies and their implications for abortion services. Journal of the American Medical Women's Association 55(Supplement 3): 191-194.

Das Gupta, M, W Chung, and L Shuzhou. 2009. Evidence for an incipient decline in the number of missing girls in China and India. *Population and Development Review* 35(2): 401-416.

Ganatra, B.R. 2000. Abortion research in India—What we know, what we need to know. In S. Jejeebhoy and R. Ramasubban (eds.), Women's reproductive health in India. New Delhi: Rawat Publications.

Ganatra, B, S Hirve, and VN Rao. 2001. Sex selective abortions: evidence from a community based study in western India. *Asia-Pacific Population Journal* 16: 109-24.

George, Sabu, "Sex ratio in India," Lancet, 2006, 367 (9524), 1725.

International Institute for Population Sciences (IIPS) and Macro International. 2007. National Family Health Survey (NFHS-3), 2005-06: India: Volume I. Mumbai: IIPS.

International Institute for Population Sciences (IIPS) and ORC Macro. 2000. National Family Health Survey (NFHS-2), 1998-99: India. Mumbai: IIPS.

Jha, Prabhat, Maya Kesler, Rajesh Kumar, Usha Ram, Lukasz Aleksandowicz, Diego Bassani, Shailaja Chandra, and Jayant Banthia, "Trends in selective abortions 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.

Johnston, H. B. 2002. Abortion practice in India: A review of literature. Mumbai: Cehat and Health Watch.

Khan M.E., S. Barge, N. Kumar, and S. Almroth. 1998. Abortion in India: Current situation and future challenges. In S. Pachauri (ed.). Implementing a Reproductive Health Agenda in India: The Beginning. New Delhi: Population Council, pp. 507-529.

Mallik, R. 2002. Sex selection: A gender-based preference for a pregnancy. Reproductive Health Matters 10(19): 189-190.

Mari Bhat, PN and AJ Francis Zavier. 2007. Factors influencing the use of prenatal diagnostic techniques and the sex ratio at birth in India. *Economic and Political Weekly* 42: 2292-2303.

Mehra S, Agrawal D. 2004. Adolescent health determinants for pregnancy and child health outcomes among the urban poor. Indian Pediatrics 2004 Feb;41(2):137-45.

Mevlude Akbulut-Yuksel and Daniel Rosenblum. 2012. The Indian Ultrasound Paradox. Discussion Paper No. 6273, Institute for the Study of Labor: Bonn, Germany.

Ministry of Health and Family Welfare (MoHFW), Government of India. 2003. Family Welfare Programme in India year book 2001. New Delhi: Department of Family Welfare, MOHFW.

World Health Organization (WHO). 2011. *Unsafe Abortion: Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2008,* sixth ed., Geneva: WHO.

Table 1: Percentage of women reporting ultrasound test in the last abortion any time during three years prior to the survey and percent distribution of women who ever experienced abortion and experienced at least one abortion in last three years, according to background characteristics in three cities of India, 2011

Background Characteristics	Percentage of women reporting an ultrasound test in the last abortion any time during three years prior to the survey	Percent of women who ever experienced abortion	Percent of women who experienced at least one abortion in the last three years
Age of women			
15-24	63.6	10.9	75.4
25-34	55.8	16.4	37.3
35+	40.9	13.1	5.2
Education of women			
< 5 years	40.6	14.3	24.3
5-9 years	52.0	15.3	28.2
10 years & above	63.6	13.5	27.9
Religion of head of HH			
Hindu	56.4	13.6	26.4
Muslim	50.0	17.5	36.1
Christian	**	13.2	20.0
Others	60.0	18.9	26.1
Caste of household			
SC/ST	45.2	14.2	29.3
OBC	53.5	15.7	24.1
Others	62.4	13.4	28.3
Media exposure			
No	50.0	13.8	13.3
Partial	57.0	14.2	27.2
Full	60.0	12.0	33.3
Standard of living index			
Low	46.4	14.5	31.0
Medium	61.4	15.9	30.4
High	64.5	11.9	19.0
Type of locality			
Slum	58.1	14.0	26.9
Non-slum	48.8	14.6	29.0
Major cities			
Bhubaneswar	37.0	9.0	22.4
Jaipur	54.7	18.6	30.4
Pune	66.7	13.8	26.4
Total	**55.9**	**14.1**	**27.3**
Number of women	**170**	**4346**	**582**

Note: ** Figure not shown based on fewer than 5 unweighted cases

Table 2: Percentage of women reporting ultrasound test conducted in the last pregnancy any time during three years prior to the HUP survey and percentage of the last pregnancy with an ultrasound test that were aborted during 3 years prior to survey according to background characteristics in three cities of India, 2011

Background characteristics	Percentage of women reporting an ultrasound test in the last pregnancy	Number of women	Percentage of last pregnancies with an ultrasound test that were terminated	Number of last pregnancies with an ultrasound test that were aborted
Age of women				
15-24	66.0	97	39.5	64
25-34	79.6	108	38.5	86
35+	**	2	**	2
Education of women				
< 5 years	48.8	41	28.1	20
5-9 years	63.8	58	32.0	37
10 years & above	87.2	109	42.5	95
Religion of head of HH				
Hindu	71.3	174	36.7	124
Muslim	77.8	27	29.2	21
Christian	**	1	**	1
Others	100.0*	6	80.0*	6
Caste of household				
SC/ST	64.3	56	31.7	36
OBC	67.9	56	34.9	38
Others	81.3	96	40.0	78
Media exposure				
No	42.9*	7	**	3
Partial	75.3	190	36.7	143
Full	85.7*	7	40.0*	6
Standard of living index				
Low	56.2	89	30.4	50
Medium	80.0	70	42.9	56
High	93.9	49	36.7	46
Type of locality				
Slum	77.2	158	41.4	122
Non-slum	60.0	50	22.0	30
Major Cities				
Bhubaneswar	78.9	38	44.4	30
Jaipur	65.3	101	23.5	66
Pune	81.2	69	52.6	56
Total	73.1	208	36.7	152

Note: * Based on fewer than 10 unweighted cases
** Figure not shown based on fewer than 5 unweighted cases

Table 3: Percentage of currently pregnant women who report that they have had an ultrasound test during the pregnancy by number of months pregnant in three cities of India, 2011

Number of months pregnant	Percent
1	0.0
2	5.3
3	5.9
4	18.4
5	21.7
6	11.8
7	15.1
8	15.1
9	5.9
Number of women	**208**

Figure 1: Percentage of currently pregnant women who report that they have had an ultrasound test during the current pregnancy by number of months pregnant in three cities of India, 2011

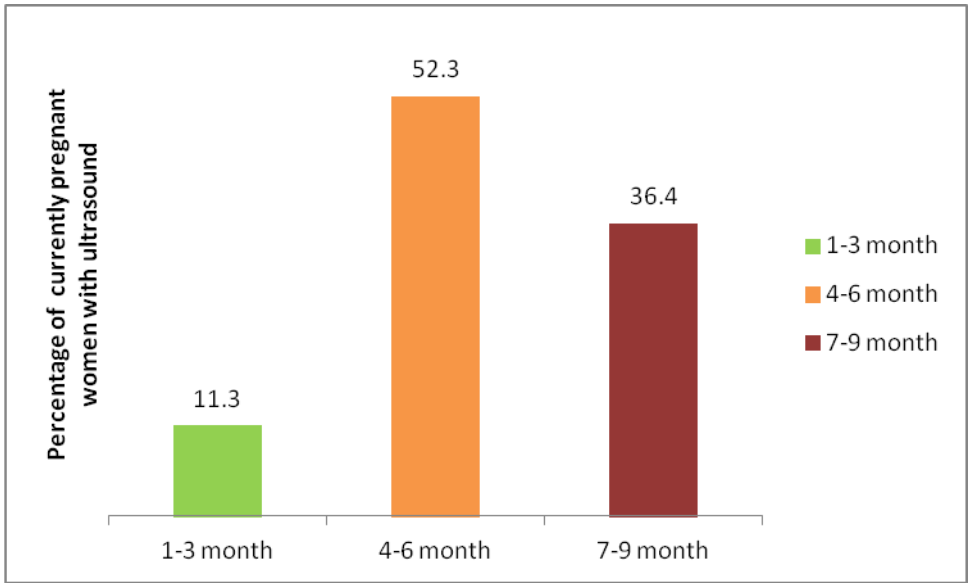

Table 4: Logistic regression analysis of the use of ultrasound testing

Adjusted odds ratio from logistic regression that an ultrasound test was conducted during all pregnancies and current pregnancy in the three years preceding the survey, according to background characteristics in three cities of India, 2011

Background Characteristics	All Pregnancies			Current Pregnancy
	One surviving chid	Two surviving children	3+ surviving children	At least one child
Age of women				
15-24®	1.000	1.000	1.000	1.000
25-34	1.461**	.483**	.988	0.410
35+	1.388	.207***	.427*	1.523
Education of women				
< 5 years®	1.000	1.000	1.000	1.000
5-9 years	2.525***	1.959***	1.665***	1.051
10 years & above	3.149***	3.400***	2.150***	1.502
Caste of household				
SC/ST®	1.000	1.000	1.000	1.000
OBC	.676*	.963	.744*	1.670
Others	.799	1.438**	.797	6.023**
Religion of head of HH				
Hindu®	1.000	1.000	1.000	1.000
Muslim	1.161	.963	1.562**	0.494
Christian	1.282	1.438	1.069	0.291
Others	3.134	1.860	1.832	0.494
Media exposure				
No®	1.000	1.000	1.000	1.000
Partial	1.872	3.023***	1.164	****
Full	1.981	4.569***	....	****
Standard of living index				
Low®	1.000	1.000	1.000	1.000
Medium	1.093	1.539***	1.799***	1.617
High	1.580**	1.820***	2.945***	1.748
Type of locality				
Non-slum®	1.000	1.000	1.000	1.000
Slum	1.242	1.454**	1.290*	0.761

*** p < 0.001; * *p < 0.05 ; * p < 0.10
Ref=reference category.

Table 5: Logistic regression analysis of the abortion

Adjusted odds ratio from logistic regression that an ultrasound test was conducted in the last abortion any time during three years prior to the survey according to background characteristics in three cities of India, 2011

Background Characteristics	Ever pregnancy			Current pregnancy
	One surviving chid	Two surviving children	3+ surviving children	At least on child
Age of women				
15-24 ®	1.000	1.000	1.000	1.000
25-34	1.135	0.970	3.849	1.131
35+	0.608**	0.769*	0.884	1.945
Education of women				
< 5 years®	1.000	1.000	1.000	1.000
5-9 years	0.350***	1.409	1.094	1.192
10 years & above	0.484***	0.831	1.424	0.759
Caste of household				
SC/ST®	1.000	1.000	1.000	1.000
OBC	1.172	0.845	0.992	0.936
Others	0.798	0.832	0.807	0.896
Religion of head of HH				
Hindu®	1.000	1.000	1.000	1.000
Muslim	2.033	1.883*	0.974	1.039
Christian	4.707**	1.000	0.620	****
Others	0.755	3.928	1.299	0.142*
Media exposure				
No ®	1.000	1.000	1.000	1.000
Partial	0.780	2.129	1.012	1.797
Full	0.885	1.068	0.987	2.161
Standard of living index				
Low ®	1.000	1.000	1.000	1.000
Medium	1.365	0.780	0.769	0.778
High	0.853	0.852	0.636*	1.229
Type of locality				
Non-slum®	1.000	1.000	1.000	1.000
Slum	1.552*	0.941	0.839	2.159

*** p < 0.001; * *p < 0.05 ; * p < 0.10 **** small cell frequency

®=reference category.