Determinants and Consequences of Induced Abortion in India: Findings from a Population Based Study

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ABSTRACT

The sociodemographic and public health importance of induced abortion in India requires thorough understanding of the factors associated with it. This paper studied the determinants of induced abortion among women in India and to examine the consequences of induced abortion on women's reproductive health. Analysis is based on 90,303 ever-married women age, 15-49, included in India's National Family Health Survey, conducted in 1998-99. Binary logistic regression methods were used to examine the association between induced abortion and possible determinants, as well as consequences of induced abortion on women's reproductive health. This study identifies women's desire to limit family size with preferred sex composition of children as an important determinant of induced abortion in India and also suggests that induced abortions may have negative consequences for women's reproductive health. Programs should focus more on the availability and accessibility of contraceptives among women to elude the reproductive health consequences of induced abortion.

INTRODUCTION

Induced abortion is a complex issue that occurs at the interface of cultural attitudes, prejudices, and modern technology, and it is a sensitive issue because it directly enters into the private arena of pregnancy and reproductive rights. Worldwide, induced abortion represents an important aspect of women's reproductive health and rights. Under the 1971 Medical Termination of Pregnancy Act, a woman in India can legally obtain an induced abortion if her 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). In the global context, in which induced abortion is restricted by law and even criminalized in several countries, India enjoys the dubious distinction of being a country in which induced abortion is legal but largely unsafe and unavailable (Ravindran, 2002). 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; Coyaji, 2000; Faundes and Hardy, 1997; Indian Council of Medical Research, 1989; Jejeebhoy, 1999; Saha and Chatterjee, 1998).

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). Still, there has been little public debate on this issue. Instead, discussion of induced abortion in India has mainly centered on the declining sex ratio, sex-selective abortion, and the proliferation of abortion clinics in urban areas. Not much is known about the consequences of induced abortion on women's reproductive health problems. Moreover, among the issues related to reproductive health, none has more controversial connotations than induced abortion (Mundigo and Indriso, 1999).

The sociodemographic and public health importance of induced abortion in India requires a more thorough understanding of the factors associated with it. More studies on induced abortion in India concentrate on abortion rates and ratios and on the demographic profiles of women. Much less is known about the socioeconomic and gender power context underlying a woman's undergoing an induced abortion. Identifying these and other factors that lead to induced abortion has important policy implications (Pallikadavath and Stones, 2006; Visaria and Visaria, 1995). In India, the social and cultural context within which the induced abortions are performed, the levels and characteristics of women resorting to induced abortion, and its consequences on women's health are unknown. Without such information, it is easy for policymakers to avoid politically sensitive decisions about this important aspect of women's health and rights. An understanding of such variation in societies would offer insight into the specific conditions that attenuate preference for sons or that perpetuate it—information that could be of use in devising policy interventions to alleviate discriminations against females. Using nationally representative data, this study examines the different factors that lead women in India to have induced abortions. The study also aims to examine the consequences of induced abortion on women's reproductive health.

An extant literature review is done in the following paragraphs to develop a theoretical support and understanding of the wider dimensions of the complex and sensitive issue of induced abortion among women in India.

Son Preference and Induced Abortion

Studies in India have identified three major factors that underlie son preference. One is the economic utility of sons: Sons are more likely than daughters to provide family labor on the farm or in a family business, to earn wages, and to support their parents during old age, although there is some recognition that sons are no longer a dependable source of old age support (Bardhan, 1985 Basu, 1989; Dharmalingam, 1996; Miller, 1981). Upon marriage, a son brings a daughter-in-law into his family, and she provides additional help around the house as well as an economic reward in the form of dowry payments. Another important advantage of having sons is their sociocultural utility. In the context of India's patrilineal and patriarchal system, having one son is imperative for the continuation of the family line, and many sons provide additional status to the family (Caldwell et al., 1989; Dyson and Moore, 1983). Finally, the utility of having sons arises from the important religious functions that only sons can provide. According to Hindu tradition, sons are needed to kindle the funeral pyre of their deceased parents and to help in the salvation of their souls.

A cultural preference for sons (Arnold and Liu, 1986; Coombs, 1979; Coombs and Sun, 1978; Das Gupta, 1987; Gu and Li, 1994; Lavely et al., 2001; Miller, 1997; Skinner, 1997; Westley, 1995; Williamson, 1976) may be a factor driving recourse to induced abortion in India, as women carrying female fetuses may decide to terminate their pregnancies (Arnold et al., 2002; Sudha and Rajan, 1999). Two recent studies in India have linked son preference to high sex ratios at birth, which indicate sex-selective abortion (Arnold et al., 2002; Retherford and Roy, 2003). Son preference is common in India, and there is evidence that this type of gender bias is increasing and spreading in modern India (Bose and Trent, 2006). The root of son preference in India lies in deeply entrenched social, cultural, and economic discrimination against women and girls. A variety of factors influence couples to have male children, such as continuation of family lineage, ritual and religious purpose, economic reasons, old age dependence, upward social mobility, and source of power (Coombs and Sun, 1978; Kapadia, 1966; Lahiri, 1984; Oldenburg, 1992). Son preference is important because where it exists, females may encounter discriminatory treatment, and female infants and children may be at a higher risk of death (Arnold et al., 1998; Choe et al., 1999; Das Gupta, 1987; Hill and Upchurch, 1995; Kishor, 1995; Koenig and D'Souza, 1986; Muhuri and Preston, 1991; Murthi et al., 1995; Pebley and Amin, 1991; Pelletier, 1998; Tabutin and Willemes, 1995). Moreover, declining fertility has meant fewer sons, and falling fertility rates may have increased son preference in India (Basu, 1999, 2000; Bhat and Zavier, 2003; Das Gupta, 1987; Das Gupta and Bhat, 1997). However, at the same time, modernizing factors including education, urbanization, and exposure to mass media also help in reducing preference for sons (Bhat and Zavier, 2003).

Abortion of fetuses because they are female is a profound and increasing problem throughout South Asia, including India. The advent of sex-selection technologies in India has added a new dimension to the discriminatory practices against girls. Strong son preference and associated sex-selective abortion are also believed to be partly responsible for a rising child sex

ratio[1] in India (Agrawal, 2004; Arnold et al., 2002; Bose, 2001; Das Gupta and Bhat, 1997; Nanda, 2006; Sen, 2003; Sudha and Rajan, 1999; Unisa et al., 2003, 2007; Visaria and Visaria, 1995). At present, sex-selective abortion accounts for roughly 11 percent of late-term, unsafe abortions in India (Johnston, 2002). Several studies, census findings, and media reports show that there is a steadily declining sex ratio in the country, especially in Punjab, Haryana, and Delhi—home to some of the most affluent regions in India. In Punjab and Haryana, the child sex ratios are a deplorable 793 and 820, respectively (Census of India, 2001). In addition, some microstudies in northern India demonstrated a widespread acceptance of the practice of sex selection of the fetus, and several researchers have documented indirect evidence in the form of increasing sex ratios at birth in hospitals or within communities (Agrawal, 2004; Booth et al., 1994; Gu and Roy, 1995; Khanna, 1997; Sachar et al., 1990; Sahi and Sarin, 1996).

Sex-selective abortion, however, is not only the result of an unintended or unwanted pregnancy. Indeed, it is the gendered preference for a certain type of pregnancy that guides the decision to undergo sex-selective abortion (Mallik, 2002). In India, the pressure to have sons has intensified 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). Sex-selective abortion is a new and growing method of control of family sex composition (Chhabra, 1996; Das Gupta and Bhat, 1997).

Regional Variation in Induced Abortion in India

Distinct cultural differences between the states in northern India and the states in southern Indian have important implications for abortion behavior. There is some evidence that the incidence of legal abortions is higher in the south than in the north (Mishra et al., 1998). Induced abortion for northern women is probably more often viewed as one of many forms of birth control, whereas induced abortion for southern women is probably more often viewed as a resolution of contraceptive failure (Bose and Trent, 2006). Important differences in reproductive behavior and maternal health are also a part of India's regional characteristics: Fertility rates are lower in the south than in the north (Dreze and Murthi, 2001; Malhotra et al., 1995), and contraceptive practice is lower in the north than in the south. The use of and access to prenatal health care is also lower in the north than in the south (International Institute for Population Sciences [IIPS] and ORC Macro, 2000). Generally speaking, these sociocultural differences between northern and southern India translate into greater overall women's status and lower levels of son preference in the south. These underlying cultural and contextual influences on southern and northern women's behavior should result in important regional differences in the predictors of induced abortion (Bose and Trent, 2006).

Women's Status and Induced Abortion

The social and demographic context of induced abortion in India is very much formed by women's overall status in the household (Bose and Trent, 2006). Researchers around the world have found that women's status and autonomy are critical in promoting change in reproductive attitudes and behavior, especially in patriarchal societies (Das Gupta, 1987; Dyson and Moore,

[1] Child sex ratio is defined here as the number of male children per 100 female children below the age of 7 years.

1983; Jeffery and Basu, 1996). Women's status is most often conceptualized in terms of economic power and access to and control of resources (Mason, 1984). Research shows that women's active participation in domestic decision-making also indicates their power within the household (Balk, 1994; Dyson and Moore, 1983; Mason, 1984; Mason and Taj, 1987; Meekers and Oladosu, 1996; Oppong, 1983; Standing, 1983). Gains in women's status are usually associated with lower fertility and increased reproductive choice (Bulatao and Lee, 1983; Kasarda et al., 1986; Oppong, 1983). Economically active women are thought to desire smaller families because of the associated opportunity costs of childbearing (Kasarda et al., 1986; Schultz, 1997). Because of the state of gender relations in India, women frequently gain status both within their families and in society as a whole by giving birth to sons (Arnold, 2001; Das Gupta, 1987, 1994; Kishor 1993, 1995; Miller 1997). Women's status is also frequently conceptualized in terms of their educational attainment: Women with higher levels of education have lower fertility (the strength of this relationship is well documented for India: Dreze and Murthi, 2001; Dreze and Sen, 1995; Jain and Nag, 1986; Murthi et al., 1995; Parikh and Gupta, 2001), and sometimes induced abortion can be a method of obtaining lower fertility.

Reproductive Health Problems and Induced Abortion

The World Health Organization Special Programme of Research, Development and Training in Human Reproduction reported induced abortion to be a major reproductive health problem (Mundigo and Indriso, 1999). A number of studies have shown that many Indian women suffer from reproductive tract infections, or RTIs (Bang and Bang, 1991; Bang et al., 1989; Jejeebhoy and Rama Rao, 1992; Pachauri and Gittlesohn, 1994). Induced abortion plays a critical role in the reproductive health of Indian women. In many instances, induced abortions—and more specifically, sex-selective abortions—take place after 12 weeks of gestation, which is not safe for the health of the women. This may lead to obstetric morbidity and infertility, as well as risking the life of the women (Unisa et al., 2003). 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 reproductive health risk of induced abortion multiplies manifold if a woman has to resort to it repeatedly (Agrawal, 2004; Ganatra et al., 2001). The relationship between induced abortion and reproductive health problems has been hardly explored in the Indian context.

In view of above literature review, the specific objectives of this study is to explore induced abortion scenario in the states of India and its change over time; to explore the associations among sex composition of living children, sex preference, women's autonomy, and sociodemographic characteristics with the likelihood of induced abortion; and to examine the consequences of induced abortion on women's reproductive health.

DATA AND METHODS

Data

Data were mainly retrieved from India's second National Family Health Survey (NFHS-2), conducted during 1998-99 (IIPS and ORC Macro, 2000). However, to study the changes in the induced abortion scenario in India over time, data from NFHS-1, conducted during 1992-93 (IIPS, 1995), also have been used. Both NFHS-1 and NFHS-2 were designed along the lines of the Demographic and Health Surveys that have been conducted in many developing countries

since the 1980s. Both NFHS-1 and NFHS-2 are nationally representative surveys that include a household sample, covering everyone in the sampled households, and an individual sample, covering all ever-married women aged 15-49 years (13-49 years in NFHS-1) within those households. NFHS-2 collected demographic, socioeconomic, and health information from a nationally representative probability sample of 90,303 ever-married women aged 15-49 years residing in 92,486 households (88,562 households and 89,777 ever-married women in the case of NFHS-1). All the states of India are represented in the sample (except the small Union Territories), covering more than 99 percent of the country's population. The sample is a multistage cluster random sample with an overall response rate of 98 percent. Details of sample design, including sampling framework and sample implementation, are provided in the basic survey report for all India (IIPS, 1995; IIPS and ORC Macro, 2000).

In NFHS-2, information on pregnancies that did not result in a live birth is collected using the birth history section. For each interval between births, as well as the interval before the first birth and after the last birth, each woman was asked whether she had any stillbirths, spontaneous abortions, or induced abortions, and if yes, how many she had. This information was summed to obtain the total number of nonlive births of each type she has had in her lifetime. In most countries, the reporting of nonlive births—particularly induced abortions—is inadequate, and retrospective surveys tend to underestimate incidences of induced abortion (Rossier, 2003). It is therefore also likely that there is some underreporting of these events in NFHS-2. However, in NFHS-1, respondents were also asked whether they had any stillbirths, spontaneous abortions, or induced abortions, and if yes, how many—but this was not asked as a part of birth history. We dropped NFHS-1 for further in-depth analysis, except for the state-wise differential and change in the experience of induced abortion among women, because the data are not exactly comparable. Moreover, only NFHS-2 data give information on specific reproductive morbidities experienced by women in the past 3 months, which is an important outcome of the study. NFHS-3 data could not be used because women were not asked specifically about induced abortions.

Response Variables

In NFHS-2, each ever-married woman aged 15-49 years was asked about her birth history. Detailed answers were sought about the women's experience, including about induced abortion, miscarriages, and stillbirths, in the context of their birth history. The dependent variable is a dichotomous variable indicating whether or not a woman experienced an induced abortion in her whole life.

Covariates

The main study variables are women's sex preference (wants equal numbers of sons and daughters, wants more sons than daughters, wants fewer sons than daughters) and sex composition of living children (1 child—1 son, 1 child—no sons, 2 children—2 sons, 2 children—1 son, 2 children—no sons, 3+ children—2+ sons, 3+ children—1 son, 3+ children—no sons, no living children). The other variables included in the analysis are women's age at effective marriage (<18 years, 18-21 years, and 22+ years), type of residence (urban, rural), religion (Hindu, Muslim, Other[2]), caste/tribe (scheduled caste, scheduled tribe,[3] other backward

[2] Other religions include Christian, Sikh, Buddhist, Jain, Jewish, Zorastrian, and others.

[3] Scheduled castes and scheduled tribes are castes and tribes that the government of India identifies as socially and economically backward and in need of special protection from social injustice and exploitation.

class, other[4]), couple's education (both illiterate, only husband literate, only wife literate, both literate), couple's working status (both not working, only husband working, only wife working, both working), wealth index[5] (lowest, second, middle, fourth, highest), media exposure[6] (no exposure, partial exposure, full exposure), women's autonomy[7] (low, medium, high), and states of India.

Computation of Indices

Some indices such as wealth index and autonomy index have been used in this study. A brief description of those indices is given here.

For assessing the economic status of the household, a wealth index has been created. The wealth index was constructed using household asset data and housing characteristics. Each household asset is assigned a weight (factor score) generated through principal components analysis, and the resulting asset scores are standardized in relation to a normal distribution with a mean of zero and standard deviation of one (Gwatkin et al., 2000). Each household is then assigned a score for each asset, and the scores were summed for each household; individuals are ranked according to the score of the household in which they reside. The sample is then divided into quintiles (i.e., five groups with an equal number of individuals in each).

Similar to the wealth index, an autonomy index has been created to determine the autonomy of the women in the household. Apart from the more commonly measured dimensions of women's status, such as education and work participation, in this study, autonomy was measured with certain direct indicators concerning women's power in the household. A set of situation-specific questions were asked to women. Each autonomy indicator is assigned a weight (factor score) generated through principal components analysis, and the resulting autonomy scores are standardized in relation to a normal distribution with a mean of zero and standard deviation of one. The sample is then divided into three groups (low, medium, and high), with an equal number of individuals in each group.

Indicators of Women's Reproductive Health

NFHS-2 collected information from all women on some common symptoms of RTIs, namely, problems with abnormal vaginal discharge or urinary tract infections (UTIs) in the 3 months

[4] Other castes include general caste.

[5] The NFHS-2 wealth index is based on the following 20 assets and housing characteristics: household electrification (electricity, kerosene, gas or oil, other source of lighting), drinking water source (pipe, hand pump, well in residence/yard/plot, public tap, hand pump, well, other water source), type of toilet facility (own flush toilet, public or shared flush toilet or own pit toilet, shared or public pit toilet, no facility), type of house (*pucca*, semi-*pucca*, *kachha*), cooking fuel (electricity, liquefied natural gas, or biogas, coal, charcoal, or kerosene, other fuel), house ownership (yes, no), number of household members per sleeping room, and ownership of a car, tractor, moped/scooter/ motorcycle, telephone, refrigerator, or color television, bicycle, electric fan, radio/transistor, sewing machine, black-and-white television, water pump, bullock cart or thresher, mattress, pressure cooker, chair, cot/bed, table, or clock/watch.

[6] Mass media exposure includes regular exposure to newspaper reading, listening to radio, and watching television. Full exposure means reading newspaper at least once a week, listening to radio at least once a week, watching television at least once a week; partial exposure means either of the above three options, and no exposure means none of the above options.

[7] Questions used for constructing the autonomy index include 1) Are you allowed to have some money set aside that you can use as you wish? (yes, no). 2) Who makes the following decision in your household: a. What items to cook? b. Obtaining health care for yourself; c. Purchasing jewelry or other major household items, d. Your going and staying with parents or siblings. The responses for each of the above categories are Respondent, Husband, Jointly with Husband, Others in Household, Jointly with Others in the Household). 3. Do you need permission to a. Go to the market, b. Visit relatives or friends. Response to each of the above categories is yes, no, not allowed to go.

preceding the survey and intercourse-related pain (often) and bleeding after intercourse (ever). Specifically, the prevalence of reproductive health problems among ever-married women is anticipated from women's self-reported experience with each of the following problems: vaginal discharge accompanied by itching, by irritation around the vaginal area, by severe lower abdominal pain not accompanied by menstruation, by fever, or by any other problem; pain or burning while urinating or frequent or difficult urination; and (among currently married women only) painful intercourse or bleeding after intercourse. However, as information on health problems is based on self-reported symptoms rather than clinical tests or examinations, the results should be interpreted with caution.

Statistical Analysis

We first examined interstate differentials in the experience of induced abortion among women using NFHS-1 and NFHS-2 data. However, analysis of the determinants is limited to only NFHS-2 data. Bivariate analysis is carried out to explore the differential in induced abortion and selected sex composition of living children, sex preference, women's autonomy, and sociodemographic characteristics of women, followed by a chi-square to test significance level. Association between induced abortion and underlying factors is examined through unadjusted and adjusted logistic regression models. The dependent variable was whether or not a woman had an induced abortion in her life. Further, the association between induced abortion and the reproductive health problems of women was examined by restoring any reproductive health problem as a dependent variable and using sociodemographic and maternal characteristics as independent variables in separate sets of adjusted and unadjusted models.

The results are presented in the form of odds ratios (ORs), with 95 percent confidence intervals (95% CIs). The estimation of confidence intervals takes into account design effects resulting from clustering at the level of the primary sampling unit. In the survey, certain states and certain categories of respondents were oversampled. Appropriate weights such as national weight and state weights were used to restore the representativeness of the sample. A pooled sample weight[8] was used for analyzing the correlates of induced abortion for two groups of states (three states formed each group) representing different cultural and demographic scenarios. The analysis was conducted through SPSS-15.

The analysis presented here is based on all reported induced abortion cases. Abortions that are reported in NFHS as induced abortions are most likely to be legal induced abortions. However, the extent to which women may have self-reported both legal and illegal types of abortions in the survey is indefinite.

Human Subjects Informed Consent

This study is based on secondary analysis of existing survey data with all identifying information removed. The survey obtained informed consent from each respondent before face-to-face interviews.

RESULTS

[8] If more than one states' data are pooled together, the individual and state weights remain no longer representative for the pooled data and need to be adjusted. A piece of external information is needed for adjustment. Here, the total target population at the time of the survey has been used from the Census of India for each state to compute the factor and pooled weight.

Induced Abortion by Women's Parity

Overall, in India, 3.1 percent and 2.6 percent of women experienced induced abortion during 1992-93 and 1998-99, respectively (see Table 1). A considerable variation in induced abortion was seen according to women's parity in both rounds of NFHS. Induced abortion was found to be at its maximum at second parity, decreasing in subsequent parities in both rounds of NFHS. For example, 4.2 percent and 3.8 percent of induced abortions were observed at women's second parity in NFHS-1 and NFHS-2, respectively, decreasing to 3.8 percent and 2.8 percent at third parity, and remaining almost constant in subsequent parities. This indicates that induced abortion is higher at parities 2-3 and lowest at parity 0.

<Table 1 about here>

Induced Abortion Scenario in States of India

Table 2, Map 1, and Map 2 present the percentage of women who have ever experienced induced abortion in India by state during both rounds of NFHS. Overall, in India, almost 3 percent of women experienced induced abortion in NFHS-1 (3.1 percent); this statistic remains almost the same in NFHS-2 (2.6 percent). An urban-rural differential is seen in induced abortion, being substantially higher in urban areas (5.6 percent in NFHS-1 and 4.9 percent in NFHS-2) than in rural areas (2.2 percent in NFHS-1 and 1.9 percent in NFHS-2).

A substantial state-wise variation in induced abortion among women in India can be seen. In NFHS-1, Delhi showed the highest incidences of induced abortion (10.9 percent), followed by Tamil Nadu (9.6 percent), Assam (6.4 percent), Goa (6.1 percent), and Manipur (5.7 percent). In contrast, induced abortions were low (less than 1 percent) in Mizoram, Meghalaya, Nagaland, and Bihar. Overall, an almost similar pattern was found during NFHS-2, with the same groups of states falling in the high and low categories of experiencing induced abortion among women. Tamil Nadu shows highest incidences of induced abortion (7.7 percent), followed by Manipur (7.5 percent), Delhi (7.2 percent), Tripura (5.1 percent), Assam (4.6 percent), and Punjab (4.5 percent). Tamil Nadu was ranked highest in the NFHS-2 but was second—after Delhi—in NFHS-1. States such as Punjab, Orissa, Manipur, Gujarat, and Maharashtra also have shown an increase in induced abortion cases among women.

<Table 2 about here>

Induced Abortion by Socioeconomic, Demographic, and Maternal Characteristics

Data on induced abortion among ever-married women aged 15-49 years in India by selected socioeconomic, demographic, and maternal characteristics are presented in Table 3. Experience of induced abortion has been explored according to women's sex preference, sex composition of living children, age at effective marriage, type of residence, religion, caste/tribe, wealth index, couple's education and working status, mass media exposure, and women's autonomy.

Experience of induced abortion significantly differs by these background characteristics of women. Experience of induced abortion was higher among women who have two living children with either one (4.2 percent) or two (3.7 percent) sons than among women who have two children without a son (2.8 percent). This illustrates the significance of sex composition of living children on experience of induced abortion among women. A significant positive relationship is also seen in the experience of induced abortion with women's age at effective marriage, wealth status, couple's education, mass media exposure, and autonomy of women.

Women residing in urban areas and belonging to other castes and other religions were also found to experience higher rates of induced abortion than their counterparts. Overall, a positive association between affluence and induced abortion is evident in our study.

<Table 3 about here>

Association between Sex Composition of Living Children, Sex Preference, and Induced Abortion

Table 4 presents unadjusted and adjusted logistic regression results showing the association between sex composition of living children, sex preference, and other sociodemographic factors and induced abortion among women. Unadjusted results show that the likelihood of experiencing induced abortion was 1.7 times higher (OR, 1.66; 95% CI, 1.40-1.96; $P < .001$) among women who have two living children with one son than among women who have only one child, who is a son. The association remains unchanged (OR, 1.60; 95% CI, 1.34-1.90; $P < .001$) when other predictors such as socioeconomic and demographic factors and location/state were controlled in the adjusted model. It is interesting to note that sex preference becomes nonsignificant when the sex composition of living children is added to the adjusted model.

Women who reside in urban areas or belong to other castes were 1.3 times more likely to have an abortion (OR, 1.29; 95% CI, 1.16-1.43; $P < .001$) than women residing in rural areas and belonging to scheduled castes (OR, 1.26; 95% CI, 1.10-1.45; $P = .001$). However, the likelihood of experiencing induced abortion was found to be 25 percent lower among Muslim women (OR, 0.75; 95% CI, 0.65-0.87; $P < .001$) than among Hindu women. The couple's education status was also associated with induced abortion. The odds of induced abortion increased to 1.7 times when both husband and wife are literate, in reference to the odds for illiterate couples (OR, 1.70; 95% CI, 1.45-2.01; $P < .001$).

Women who have partial or full exposure to mass media were found to be positively associated with experiencing induced abortion in the unadjusted model. However, the direction of odds gets somewhat indeterminate in the adjusted model (OR, 1.38; 95% CI, 1.16-1.64; $P < .001$ for full exposure; OR, 1.47; 95% CI, 1.29-1.68; $P < .001$ for partial exposure). Women with higher autonomy were 1.2 times more likely (OR, 1.20; 95% CI, 1.08-1.34; $P = .001$) to experience induced abortion than women with lower autonomy. Women belonging to the higher wealth index were consistently found to be positively associated with experiencing induced abortion both in the unadjusted and adjusted models. The likelihood of experiencing induced abortion was almost two times higher (OR, 1.89; 95% CI, 1.53-2.33; $P < .001$) among women belonging to fourth wealth index and three times higher (OR, 3.02; 95% CI, 2.41-3.80; $P < .001$) among women belonging to highest wealth index than women in the lowest wealth index. Other sociodemographic factors such as age at effective marriage and couple's working status were not found to be significantly associated with induced abortion in the adjusted model.

To adjust the state differential in induced abortion, we introduced state as a predictor variable in the adjusted model. The likelihood of experiencing induced abortion was found to be more than six times higher in Tamil Nadu (OR, 6.28; 95% CI, 4.64-8.51; $P < .001$) and more than five times in Manipur (OR, 5.28; 95% CI, 2.72-10.24; $P < .001$) and Assam (OR, 5.26; 95% CI, 3.70-7.48; $P < .001$) compared with Kerala. The odds of women's experiencing induced abortion was also two to three times higher in Delhi (OR, 2.83; 95% CI, 1.95-4.10; $P < .001$) and

Punjab (OR, 2.34; 95% CI, 1.62-3.37; $P < .001$)—the states with an imbalanced child sex ratio. However, the likelihood of experiencing induced abortion was found to be significantly lower among women in Karnataka (OR, 0.58; 95% CI, 0.38-0.88; $P = .011$) and Andhra Pradesh (OR, 0.68; 95% CI, 0.47-1.00; $P = .047$).

<Table 4 about here>

Association between Sex Composition of Living Children, Sex Preference, and Induced Abortion in the Two Different Sociocultural Set-Ups

We created two groups of states based on the differences in their sociocultural and demographic characteristics in terms of son preference, child sex ratio, women's literacy, and health care seeking behavior for further in-depth study. The first group includes the northern states of Delhi, Punjab, and Haryana, and the second group includes the southern states of Andhra Pradesh, Karnataka, and Kerala. To see the association between induced abortion and underlying factors in these two different sociocultural set-ups, we again restored logistic regression models separately for these two groups of states. Table 5 presents adjusted logistic regression results showing the associations among sex composition of living children, sex preference, and other sociodemographic factors and induced abortion among women in two different models: model 1 for Delhi, Punjab, and Haryana and model 2 for Andhra Pradesh, Karnataka, and Kerala. The results were found to be quite different in the two models. In model 1, sex composition of living children, residence, and couple's educational status were found to be significant for induced abortion. The likelihood of experiencing induced abortion was more than two times higher among women who have two living children with two sons (OR, 2.71; 95% CI, 1.55-4.72; $P < .001$), one son (OR, 2.12; 95% CI, 1.24-3.63; $P = .006$), or no son (OR, 2.61; 95% CI, 1.32-5.17; $P = .006$) compared with women having one child, who is a son.

In addition, Women who reside in urban areas were two times more likely to have an induced abortion (OR, 2.06; 95% CI, 1.52-2.80; $P < .001$) than women residing in rural areas. Couple's education was also positively and consistently associated with women's experience of induced abortion in this group of states. The likelihood of induced abortion was two and half times greater (OR, 2.45; 95% CI, 1.36-4.41; $P = .003$) when both the husband and wife were literate compared with illiterate couples.

In contrast, in model 2, wealth status and caste/tribe were found to be significant for induced abortion for group 2 states. Women belonging to the highest wealth index (OR, 6.76; 95% CI, 1.94-23.52; $P = .003$) and belonging to scheduled tribes (OR, 7.05; 95% CI, 2.41-20.59; $P < .001$) were almost seven times more likely to abort than women belonging to the lowest wealth index and than scheduled caste women. However, neither sex preference nor sex composition of living children was found to be significant for women's experience of induced abortion in these states.

<Table 5 about here>

Induced Abortion and Reproductive Health Problems

Table 6 presents self-reported specific reproductive health problems among ever-married women aged 15-49 years in India, according to number of induced abortions. Reproductive health problems are seen in terms of the presence of any abnormal vaginal discharge, vaginal discharge accompanied by itching/irritation, bad odor, fever, abdominal pain, and other problems;

symptoms of a UTI; intercourse-related problems; and so on. Most of the reproductive health problems are significantly exacerbated with an increase in the number of induced abortions. For example, 40 percent of women reported abnormal vaginal discharge who had two or more induced abortions compared with 36 percent who had one induced abortion and 30 percent with no induced abortion history ($P < .001$). Similarly, a substantial differential ($P < .001$) is found in the case of vaginal discharge accompanied by itching/irritation, severe lower abdominal pain, fever, and other problems according to the number of induced abortions. Symptoms of a UTI were reported by 27 percent of women who had had two or more induced abortions compared with 20 percent of women with one induced abortion and only 18 percent of women with no induced abortion history. Any abnormal vaginal discharge or symptoms of a UTI also notably increased ($P < .001$) with an increase in the number of induced abortions. Overall, a profound differential ($P < .001$) is observed in any reproductive health problems according to number of induced abortions. Fifty-two percent of the women who had two or more induced abortions experienced reproductive health problems compared with 46 percent of women who had one induced abortion and 39 percent women with no induced abortion history.

<Table 6 about here>

Association between Induced Abortion and Reproductive Health Problems

The association between induced abortion and any reproductive health problem among women is seen by restoring logistic regression and is presented as an adjusted and an unadjusted model in Table 7. The unadjusted model shows that the likelihood of experiencing any reproductive health problems is 1.4 times higher (OR, 1.35; 95% CI, 1.24-1.48; $P < .001$) among women who had one induced abortion compared with women who had no abortion history, which increases to a likelihood that is 1.7 times higher (OR, 1.71; 95% CI, 1.40-2.08; $P < .001$) among women who had had two or more induced abortions. The association remains significant and even more profound when we adjust for sociodemographic and maternal factors such as number of children ever born, time since last birth, current age, type of residence, religion, caste/tribe, couple's education and working status, mass media exposure, autonomy, and wealth status. Incidence of any reproductive health problem was 1.5 times higher (OR, 1.46; 95% CI, 1.33-1.60; $P < .001$) among women who had one induced abortion compared with women who had no induced abortion history, increasing to 1.9 times higher (OR, 1.85; 95% CI, 1.52-2.27; $P < .001$) among women who had two or more induced abortions in the adjusted model.

Other factors, such as number of children ever born, time since last birth, women's current age, religion, caste/tribe, autonomy, and wealth status were also associated with reproductive health problems among women. The likelihood of experiencing any reproductive health problem was higher among Muslim women (OR, 1.59; 95% CI, 1.52-1.66; $P < .001$) than Hindu women. However, the likelihood of experiencing any reproductive health problems was 7 percent lower in other castes (OR, 0.93; 95% CI, 0.89-0.96; $P < .001$) than scheduled caste, 11 percent lower (OR, 0.89; 95% CI, 0.86-0.92; $P < .001$) among women with higher autonomy than those with lower autonomy, and 21 percent lower (OR, 0.79; 95% CI, 0.74-0.85; $P < .001$) among women belonging to highest wealth index than those belonging to the lowest. Interestingly, other factors such as residence, education, working status, and media exposure were not found to be significantly associated with reproductive health problems.

<Table 7 about here>

DISCUSSION

This study attempted to show the association between sociodemographic factors and likelihood of induced abortion by women, using nationally representative individual level data from NFHS-2. The consequences of repeated induced abortions on women's reproductive health were also examined. This study found that a woman's desire to limit family size with preferred sex composition of children, coupled with her autonomy and sociocultural context, largely determines her experience of induced abortion.

An urban-rural differential has been found in induced abortion among women, with incidence of induced abortion being substantially higher among women in urban than in rural India. A substantial state-wise variation in induced abortion among women in India also was found. In both NFHS-1 and NFHS-2, almost the same groups of states fall in the high and low categories of prevalence of induced abortion.

Delhi and Tamil Nadu show the highest incidences of induced abortion. The fully urban character of Delhi and its correspondingly well-developed health infrastructure, including legalized abortion services, could be the key factor for the state's higher rate of induced abortions among women. A high female literacy rate is yet another factor leading to higher reporting of induced abortions (Babu et al., 1998). This may also be the reason that Goa is found to have a relatively higher incidence of induced abortion. In contrast, the tribal and backward character of Mizoram, Nagaland, and Meghalaya, along with the inaccessibility and isolation of these northeastern states from the mainstream population, could account for the lower incidence of induced abortions among women in these states. It is extraordinary fact that other northeastern states such as Manipur, Assam, and Tripura have shown a higher prevalence of induced abortion. The reason for this may be that the women in these states are using abortion as a means of contraception, as the use of either traditional contraceptive methods or less-reliable methods such as rhythm/safe period and withdrawal is found to be higher (IIPS and ORC Macro, 2000). The failure of the traditional methods of birth control may have led women to resort to induced abortion. Abortion is one of the oldest methods of averting unwanted births, and studies show that couples will switch to induced abortion as a method of birth control if they find contraceptive methods unreliable (Iranmahboob and Zinab, 2003).

We examined the association between women's sex preference and sex composition of living children and experience of induced abortion. Bearing male children is an important feature of family formation in India and is a significant determinant of induced abortion behavior among women (MacQuerrie et al., 2007). Boy preference is so ingrained in the Indian family system that many women do not feel that they have done their wifely duty until they produce a son. The only way they feel their life is fulfilled if they produce a son (Gentleman, 2006). Our study shows that women who have two living children with one being a son were almost twice as likely to have experienced induced abortion. It may be more likely that to achieve this composition, induced abortion might have played an important role for these women. Retherford and Roy (2003) used NFHS-2 data to point out that small family norms, which currently appear to be strongest in families that already have two children, and the large proportion of women who wish to stop childbearing after having three children and who have a strong sex preference, mainly for sons, clearly determine the third birth order. Therefore, despite the positive effect of son preference on family size, individual son preference is also expected to increase the risk of

induced abortion in India. Similar to our result indicating higher induced abortion rates among women with two living children, other studies have also reported the average number of children living at the time of Medical Termination of Pregnancy (MTP) acceptance to be two to four (Gupta, 1976; Jamshedji and Kokate, 1990; Khan et al., 1990; Rao and Kanbargi, 1980; Thakore et al., 1974).

Sex preference has not turned up as a significant variable in our model, as it used to be greatly biased by the present sex composition of living children. Asking a question about ideal family size is sometimes criticized on the grounds that women tend to adjust their ideal family size upward as the number of their living children increases in a process of rationalizing previously unwanted children as wanted. It is argued that the question about ideal family size prompts many women to state the actual number of children they already have as their ideal. Son preference is culturally imbedded in Indian society, but its strength varies substantially from one part of the country to another. NFHS-2 findings for India show that son preference tends to be stronger in the northern part of the country than elsewhere. The weakest son preference is found in Meghalaya, Mizoram, Tamil Nadu, Kerala, Karnataka, and Goa (IIPS and ORC Macro, 2000).

Our study found women's autonomy to be greatly associated with her experience of induced abortion. An earlier study by this author in rural northern India had a similar result (Agrawal, 2004; Agrawal and Unisa, 2007). Other studies also found that women with few restrictions on their movement were twice as likely to attempt an induced abortion than those with no restrictions (MacQuarrie et al., 2007). However, it is widely recognized that women in developing countries are often not the sole decision-makers regarding childbearing, contraceptive use, and induced abortion. This is especially true in societies based on patriarchal family systems, in which women's decision-making power is restricted by social norms governing gender roles, household power dynamics, and communication patterns (MacQuarrie et al., 2007). A number of studies have also documented household abortion decision-making dynamics specific to the Indian context (Elul et al., 2004).

The age distribution of the induced abortion seekers in many studies shows a higher proportion of women in the younger age groups; that is, between 20 and 34 years of age (Chhabra and Nuna, 1994; Jamshedji and Kokate, 1990; Khan et al., 1990; Rao and Kanbargi, 1980; Somasundaram and Mehta, 1984). According to government records, more than two-thirds of abortions take place among women under age 30 years in India. Our study also agrees with this finding (analysis not shown). It may be expected that working women will be more likely to have abortions than nonworking women because of inherent conflicts between their roles as employees and their role as mother, along with their desire for smaller family size and lower tolerance for unplanned pregnancies (Bose and Trent, 2006). This could also be a result of the women's need to postpone births or to take up or continue employment. However, evidence from several small studies suggests that the reasons why women in India seek induced abortions are diverse (Arnold et al., 2002; Bairagi, 2001; Bankole et al., 1998; Booth et al., 1994).

In the present study, we found couple's education, and more specifically, women's education, to be significantly associated with induced abortion. This finding is consistent with a review of qualitative studies conducted in India (Ganatra and Hirve, 2002; Ravindran and Balasubramanian, 2004; Visaria et al., 2004). The likely factor could be that educated women are more likely than uneducated women to have information and access to induced abortion services.

Many other studies have shown that by and large, educated women were taking advantage of the MTP facility (Jamshedji and Kokate, 1990; Khan et al., 1990; Rao and Kanbargi, 1980; Rao and Panse, 1975). However, the Indian Council of Medical Research study (1989) found a very large percentage (more than 60 percent) of abortion acceptors, both legal and illegal, to be illiterate. Because educational attainment and access to abortion services are both expected to increase among women in India as a result of current national policies and programs and the country's general economic development, a rise in abortion ratios can be anticipated (Pallikadavath and Stones, 2006).

Women who lived in rural areas were less likely than their urban counterparts to have had an induced abortion. This may reveal not only a lack of abortion services in rural India but also a lower demand for abortion as a result of limited exposure to the media and to the outside world (Pallikadavath and Stones, 2006). Other reasons could be that urban residence promotes a more antenatal lifestyle and increases the cost of having children (Easterlin, 1983). Desired family size is lower in urban areas than in rural areas. Moreover, social and cultural norms promoting small family size are more readily diffused in urban areas because of better media access and greater exposure to diverse social groups (Babu et al., 1998; Dreze and Murthi, 2001). It can also be said that the government's family planning message is more widely dispersed in urban than rural areas. Urban residents not only have more exposure to the media but also have greater access to government health services (Jesani and Iyer, 1993).

Chhabra and Nuna (1994) point out that induced abortion is a universal need, cutting across communities, class, and even cultural and religious backgrounds. We found induced abortion among Muslim women to be considerably lower than among Hindu women, and it is lower still among scheduled caste/scheduled tribe women than other caste women. This may reflect both less access to and less demand for induced abortion among Muslim women, owing to religious norms. Muslim women in India have both higher fertility (Dreze and Murthi, 2001), and their religious beliefs often prelude the use of abortion (Babu et al., 1998; Bose and Trent, 2006; Pallikadavath and Stones, 2006; Rao and Kanbargi, 1980). Studies also suggest that women who do not belong to scheduled caste or tribe are more likely to obtain abortions (Agrawal and Unisa, 2007; Babu et al., 1998), and Khan et al. (1990) found considerable variation by caste composition of the MTP acceptors in three Indian cities study.

We found women's higher wealth status to be significantly and positively associated with experience of induced abortion. Higher standards of living or higher income increase the likelihood of obtaining an abortion (Bose and Trent, 2006). The reason for this increase may be that women belonging to households with a higher standard of living have better access to health services in general, and abortion services in particular. In addition, services from private practitioners are more expensive than government health services; therefore, women with higher wealth status are likely to have greater access to both public and private abortion services.

Our result for abortion differential in the two groups of states in India suggests that induced abortion in the first group of states, comprising Delhi, Punjab, and Haryana, is strongly influenced by women's preference for limiting family size with desired composition of sex than in the second groups of states, comprising Andhra Pradesh, Kerala, and Karnataka. This may be a result of pervasive son preference and sex-selective abortion practices. Son preference, coupled

with family size preference, significantly increases the likelihood of induced abortion in the first group of states in northern India, but it has no significant effect in the second group of states in southern India. The underlying cultural and contextual factors result in important differences in the predictors of induced abortions in the two groups of states. It was also anticipated that there would be less variation in abortion-seeking behavior across different groups of women in the southern group of states than in the northern group. The perception of small family norm is comparatively a new occurrence in the northern states of India, which gradually emerged with increasing women's education and employment. However, the diffusion of the small family norm is greater and already existed for southern women in contrast to northern women (Basu, 1992; Guilmoto and Rajan, 2001). Therefore, the individual characteristics of women have a weak effect on the likelihood of experience of induced abortion for the southern women compared with women from the north.

Induced abortions may have immediate or long-term health consequences for women. Our study shows some remarkable findings in this regard. The analysis reveals that the experience of induced abortion is significantly associated with reproductive health problems among women, independent of other factors. Incidence of any reproductive health problem was 1.5 times higher among women who had one abortion, increasing to 1.9 times higher among women with two or more abortions with reference to women with no abortion history.

Reproductive health problems among women belonging to other castes and belonging to households with better economic condition were found to be lower, which suggests that these women have better knowledge and practice of hygienic behavior. In India, women who belong to other castes mostly belong to households with higher economic conditions. It is more likely that those women would have better health-care-seeking behavior for their reproductive health problems. This may have led those women to report fewer reproductive health problems. In addition, the higher autonomy of women was greatly associated with lower reproductive health problems among women. This may be because their having greater autonomy gives these women better access to health care services and, consequently, fewer reproductive health problems. Other factors such as residence, education, working status, and media exposure were not found to be significantly associated with reproductive health problems.

CONCLUSIONS AND POLICY IMPLICATIONS

Induced abortion is possibly the most discordant women's health issue that policy makers and planners face, particularly in developing countries. This study tried to explicate the induced abortion scenario in India. The study added some empirical finding on determinants and consequences of induced abortion; they could be useful for policy formulations in India. Given the recent evidence on low child sex ratios in India as a whole, and in some regions in particular, the incidence of induced abortions in India can be said to be indicative of women achieving the desired sex composition within small families (Chhabra and Nuna, 1994; Das et al., 2000). Our study shows that in India, induced abortion is more common among women in the second parity, which reflects the influence of women's desire to limit family size with desired sex composition of children on abortion. An important finding of this study is that the sex composition of children continues to be strong and significantly associated with women's experience of induced abortion, even after controlling for education, work status, wealth status, media exposure, women's

autonomy, and urban/rural residence. This reflects that women are using induced abortion to achieve their desire family size and sex composition.

The magnitude of induced abortion and its related complications are of interest to health planners, as knowledge of these aspects could be of help in the formulation of suitable health policies for women. Our study also shows that induced abortion is an important indicator of the reproductive health problem among Indian women. Despite the legalization of abortion in India in 1971, morbidity continues to remain a serious problem for a majority of women undergoing induced abortions. Our study ascertained that women's reproductive health deteriorates more when women resort to repeated induced abortion.

In conclusion, it can be said that still there is a need to focus on unmet need for contraception in India to avoid the burden of unwanted pregnancy and induced abortion among women. More extensively, there is need to reduce son preference. The desire for sons is deeply entrenched in Indian society, and tackling this would require alteration of social norms and attitudes of Indian people (Pande and Astone, 2007). Not merely improving women's status and giving access to higher education will help in mitigating this social problem, as it is evident in India that women with higher education, belonging to well-off families, and residing in urban areas are more frequently resorting to sex-selective abortion. Strong and stringent policies and programs are required not only at the national level but also at the regional level, which would include mechanisms to make girls valuable to the family and society and lessen gender differences within households through various social uplift programs. Such programs first need to recognize variations in women's autonomy/status in the household and society in relation to son preference, as women in India gain higher autonomy in the household by having a son.

Programs should focus more on the availability and accessibility of contraception among women to elude the reproductive health consequences of induced abortion. There is an urgent need for awareness about possible adverse consequences of repeated induced abortions on a woman's reproductive health. More in-depth qualitative studies are needed at the community level to better understand the determinants and consequences of this complex and sensitive issue in India. In particular, further investigation and research are needed to ascertain the long-term reproductive health consequences of induced abortion.

LIMITATIONS OF THE STUDY

Although rigorous methods were employed to maintain the data quality of NFHS, some limitations are inherent to a cross-sectional survey of this type, which involves reporting of past behaviors. Because abortion is a sensitive topic for many people, it is commonly underreported in national surveys (Arnold et al., 2002; Fu et al., 1998), and information about women who have induced abortions is limited probably because of recall lapse error and reluctance to reveal such incidences. It is likely that illegal abortions, or abortions performed with indigenous methods, are not reported, are underreported, or are reported as spontaneous abortions (Unisa et al., 2007). However, to minimize this bias, NFHS-2 interviewers were specially trained to ask questions that could help distinguish among induced abortions, miscarriages, and stillbirths (Pallikadavath and Stones, 2006).

Our analysis shows that about 3 percent of women experienced induced abortion in NFHS-1 (1992-93), which percentage declined slightly (2.6 percent) in NFHS-2 (1998-99). Less

reporting of induced abortion cases during NFHS-2 could be a result of the passage of the Pre-Natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act in 1994, which prohibits the use of prenatal diagnostic techniques for the purpose of antenatal sex determination (Ministry of Health and Family Welfare, 2005). The 1994 law was an attempt to reverse India's rampant use of sex-selective abortion, and the lopsided sex ratio this has produced (Power, 2006). India's 2001 census showed that there were 927 girls to every 1,000 boys, down from 945 in 1991 and 962 in 1981. Moreover, not a single district in India had a child sex ratio of less than 800 in 1991, whereas in 2001, there were 14. A comparison of the sex ratio at birth for the period 1996-98 with 1992-95 suggests that the importance of sex-selective abortion has grown in the post-1995 period (Arnold et al., 2002) despite the passage of the act. The passage of this law coupled with uproar in the mass media regarding adverse sex ratio in India might have lead women not to report induced abortion.

Another limitation of this study is the potential endogenity between women's experience of induced abortion and parity/sex composition of living children. It is quite plausible that women have obtained their current sex composition (and number of living children) through induced abortion or abortions. As women who are currently at second parity are most likely to have experienced induced abortion, it seems that women who are trying to limit their family size may be more likely to experience induced abortion. However, the directionality of the association is unclear, as the abortion could have happened either before or after the achievement of a specific parity/sex composition. Therefore, although we do get a consistent pattern of experience of induced abortion of women with sex composition of living children, the results need to be interpreted with caution.

Women interviewed in NFHS-2 were not asked to provide the exact dates of pregnancy terminations. In the birth history segment of the questionnaire, they were asked to report whether they had a terminated pregnancy between each birth, as well as before and after the first and last births. Because the pregnancy outcome record is linked to the birth records, the only way to determine the approximate date of when an induced abortion occurred is to look at abortions that happened after the most recent birth or births. Induced abortion during last 5 years could have been analyzed to minimize lifetime abortion experience and give a better association between induced abortion and reproductive health. However, when we looked at women whom we knew had an induced abortion in the last 5 years because they had at least one birth in the last 5 years, we realized we were biasing the sample toward more fertile women—exactly the women who were least likely to have experienced reproductive health problems, as many reproductive health problems can lead to infertility. A major limitation of the current analysis, therefore, is the possible time elapsed between experience of induced abortion (which could have happened at any point in a woman's lifetime) and reproductive health problems in the 3 months before interview. Moreover, the study is based on reported symptoms and experiences of reproductive health problems. Therefore, although we get a clear positive association between number of induced abortions and reproductive health problems, the results should be interpreted with caution.

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Table 1 Induced abortion by parity

Induced abortion among ever-married women aged 15-49 years by parity, India, National Family Health Survey 1 (1992-93) and National Family Health Survey 2 (1998-99)

Women's parity	National Family Health Survey 1 (1992-93)			National Family Health Survey 2 (1998-99)		
	Total number of women	Number of women who experienced induced abortion	Percent Induced Abortion	Total number of women	Number of women who experienced induced abortion	Percent Induced Abortion
0	12,214	105	0.9	8,682	106	1.2
1	14,930	343	2.3	14,930	321	2.2
2	18,675	790	4.2	22,287	846	3.8
3	18,002	683	3.8	19,588	542	2.8
4	12,045	398	3.3	12,101	308	2.5
5	7,056	219	3.1	6,598	143	2.2
6+	6,786	227	3.3	6,117	123	2.0
Total	89,708	2,765	3.1	90,303	2,389	2.6

Table 2 Women who have ever experienced induced abortion

Percentage of ever-married women age 15-49 years who have ever experienced induced abortion in India by states and region, National Family Health Survey 1 (1992-93) and National Family Health Survey 2 (1998-99)

State/Region	National Family Health Survey 1			National Family Health Survey 2		
	Total number of women	Number of women who experienced induced abortion	Percentage induced abortion	Total number of women	Number of women who experienced induced abortion	Percentage induced abortion
India, Urban	23,420	1,314	5.6	23,643	1,154	4.9
India, Rural	66,286	1,450	2.2	66,661	1,236	1.9
India, Total	89,706	2,764	3.1	90,304	2,390	2.6
Northern region	10,621	436	4.1	20,750	673	3.2
Delhi	3,455	376	10.9	2,477	179	7.2
Haryana	2,846	117	4.1	2,908	59	2.0
Himachal Pradesh	2,961	110	3.7	3,012	69	2.3
Jammu and Kashmir	2,766	146	5.3	2,744	121	4.4
Punjab	2,995	110	3.7	2,796	125	4.5
Rajasthan	5,201	143	2.7	6,813	120	1.8
Central region	21,985	465	2.1	16,233	346	2.1
Madhya Pradesh	6,241	84	1.3	6,941	116	1.7
Uttar Pradesh	11,431	284	2.5	9,292	231	2.5
Eastern region	21,985	465	2.1	15,857	309	1.9
Bihar	5,949	53	0.9	7,024	38	0.5
Orissa	4,257	99	2.3	4,425	116	2.6
West Bengal	4,322	162	3.7	4,408	155	3.5
Northeastern region	3,390	183	5.4	11,015	393	3.6
Arunachal Pradesh	882	13	1.5	1,117	11	1.0
Assam	3,006	191	6.4	3,441	157	4.6
Manipur	953	54	5.7	1,435	107	7.5
Meghalaya	1,137	5	0.4	945	7	0.7
Mizoram	1,045	1	0.1	1,048	5	0.5
Nagaland	1,149	6	0.5	818	29	3.5
Sikkim	—	—	—	1,107	20	1.8
Tripura	1,100	61	5.5	1,104	56	5.1
Western region	12,983	325	2.5	10,482	350	3.3
Goa	3,141	191	6.1	1,246	55	4.4
Gujarat	3,832	72	1.9	3,845	130	3.4
Maharashtra	4,105	114	2.8	5,391	166	3.1

Southern region	20,844	922	4.4	15,966	480	3.0
Andhra Pradesh	4,275	72	1.7	4,032	35	0.9
Karnataka	4,400	115	2.6	4,374	37	0.8
Kerala	4,319	159	3.7	2,884	48	1.7
Tamil Nadu	3,943	378	9.6	4,676	360	7.7

Note: The population covered in NFHS-2 differs slightly from that in NFHS-1. NFHS-1 did not include Sikkim and the Kashmir region of Jammu and Kashmir. NFHS-2 covered all the 26 states, but the survey work in Tripura was delayed considerably as a result of some local problems. Therefore, estimates for Tripura are not included in the national estimates of the national report. However, the population of the regions not common in the two surveys is small and should have only a negligible effect on the comparability of the national estimates from the two surveys.
— Data not available

Table 3 Induced abortion by socioeconomic, demographic, and maternal characteristics
Induced abortion among ever-married women aged 15-49 years in India by selected socioeconomic, demographic, and maternal characteristics, India, National Family Health Survey 2 (1998-99)

Socioeconomic, demographic, and maternal characteristics	Induced abortion		χ^2 *P* value	Total number of women
	Percentage	Number		
Sex preference			<.001	
Wants equal son and daughter	2.9	1,779		60,507
Wants son more than daughter	2.0	549		27,853
Wants son less than daughter	3.1	58		1,857
Sex composition of living children			<.001	
1 child—1 son	2.6	202		7,770
1 child—no son	2.2	151		6,738
2 children—2 son	3.7	245		6,599
2 children—1 son	4.2	482		11,356
2 children—no son	2.8	104		3,671
3+ children—2+ son	2.4	722		30,017
3+ children—1 son	2.7	304		11,063
3+ children—no son	2.7	60		2,206
No living child(ren)	1.1	119		10,882
Age at effective marriage			<.001	
<18 years	2.0	1,155		57,236
18-21 years	3.4	874		25,805
22+ years	5.0	361		7,262
Type of residence			<.001	
Urban	4.9	1,154		23,643
Rural	1.9	1,236		66,661
Religion			<.001	
Hindu	2.6	1,956		73,824

Muslims	2.1	240		11,319
Others	3.7	188		5,080
Caste/tribe			<.001	
Scheduled caste	1.9	317		16,517
Scheduled tribes	1.3	101		7,863
Other backward class	2.7	799		29,722
Other castes	3.3	1,158		35,330
Wealth index			<.001	
Lowest	1.0	160		16,569
Second	1.2	210		17,816
Middle	2.1	400		18,867
Fourth	3.0	563		18,948
Highest	5.8	1,056		18,103
Couple's education			<.001	
Both illiterate	1.1	265		24,979
Only husband literate	1.8	504		27,271
Only wife literate	3.2	88		2,781
Both literate	4.4	1,528		34,991
Couple's working status			.001	
Both not working	2.5	42		1,654
Only husband working	2.8	1,481		52,698
Only wife working	2.2	18		815
Both working	2.4	803		33,960
Mass media exposure			<.001	
No exposure	1.1	418		37,412
Partial exposure	3.4	1,441		42,082
Full exposure	4.9	530		10,784
Autonomy			<.001	
Low	2.0	648		32,679
Medium	2.4	679		28,024
High	3.6	1,064		29,602
Total	2.65	2,390		90,304

Table 4 Association between sex preference, sex composition of living children, and induced abortion: all India

Unadjusted and adjusted odds ratios with 95 percent confidence interval (95% CI) from logistic regression analysis showing association between sex preference, sex composition of living children, and induced abortion among ever-married women aged 15-49 years in India and states controlling for socioeconomic, demographic, and maternal characteristics, National Family Health Survey 2 (1998-99) (n = 89,056)

	Induced abortion							
	Unadjusted (95% CI)				Adjusted (95% CI)			
Predictor variables	Odds ratio	LL	UL	*P* value	Odds ratio	LL	UL	*P* value
Sex preference								
Wants equal son and daughter (ref)	1.00				1.00			
Wants son more than daughter	0.66	0.60	0.73	<.001	0.95	0.86	1.06	.352
Wants son less than daughter	1.07	0.82	1.39	.641	1.16	0.88	1.53	.288
Sex composition of living children								
1 child—1 son (ref)	1.00				1.00			
1 child—no son	0.86	0.69	1.06	.160	0.88	0.71	1.10	.257
2 children—2 son	1.44	1.20	1.74	<.001	1.50	1.23	1.82	<.001
2 children—1 son	1.66	1.40	1.96	<.001	1.60	1.34	1.90	<.001
2 children—no son	1.09	0.86	1.39	.477	1.07	0.84	1.38	572
3+ children—2+ son	0.92	0.79	1.08	.322	1.37	1.16	1.62	<.001
3+ children—1 son	1.06	0.88	1.27	.537	1.33	1.10	1.60	.003
3+ children—no son	1.04	0.78	1.39	.795	1.33	0.98	1.80	.064
No living child(ren)	0.42	0.33	0.52	<.001	0.52	0.41	0.66	<.001
Age at effective marriage								
<18 years (ref)	1.00				1.00			
18-21 years	1.70	1.56	1.86	<.001	0.98	0.85	1.13	.792
22+ years	2.54	2.25	2.86	<.001	0.95	0.83	1.09	.446
Type of residence								
Rural (ref)	1.00				1.00			
Urban	2.72	2.50	2.95	<.001	1.29	1.16	1.43	<.001
Religion								
Hindu (ref)	1.00				1.00			
Muslims	0.80	0.69	0.91	.001	0.75	0.65	0.87	<.001
Others	1.41	1.21	1.65	<.001	1.04	0.87	1.24	.661
Caste/tribe								
Scheduled caste (ref)	1.00				1.00			
Scheduled tribes	0.66	0.53	0.83	<.001	0.89	0.70	1.13	.344
Other backward class	1.41	1.24	1.61	<.001	1.15	1.00	1.32	.057

Other castes	1.73	1.53	1.96	<.001	1.26	1.10	1.45	.001
Couple's education								
Both illiterate (ref)	1.00				1.00			
Only husband literate	1.76	1.51	2.04	<.001	1.24	1.06	1.45	.008
Only wife literate	3.06	2.40	3.91	<.001	1.76	1.36	2.27	<.001
Both literate	4.26	3.74	4.86	<.001	1.70	1.45	2.01	<.001
Couple's working status								
Both not working (ref)	1.00				1.00			
Only husband working	1.14	0.83	1.55	.419	1.06	0.77	1.46	.715
Only wife working	0.90	0.51	1.57	.698	1.21	0.69	2.15	.506
Both working	0.94	0.69	1.29	.698	1.32	0.95	1.83	.099
Mass media exposure								
No exposure (ref)	1.00				1.00			
Partial exposure	3.14	2.81	3.50	<.001	1.47	1.29	1.68	<.001
Full exposure	4.58	4.02	5.21	<.001	1.38	1.16	1.64	<.001
Autonomy								
Low (ref)	1.00				1.00			
Medium	1.23	1.10	1.37	<.001	1.15	1.03	1.29	.013
High	1.84	1.67	2.03	<.001	1.20	1.08	1.34	.001
Wealth index								
Lowest (ref)	1.00				1.00			
Second	1.22	0.99	1.50	.057	1.09	0.88	1.35	.431
Middle	2.22	1.84	2.66	<.001	1.61	1.32	1.97	<.001
Fourth	3.13	2.62	3.74	<.001	1.89	1.53	2.33	<.001
Highest	6.34	5.36	7.49	<.001	3.02	2.41	3.80	<.001
States in India								
Kerala (ref)	1.00				1.00			
Andhra Pradesh	0.51	0.36	0.74	<.001	0.68	0.47	1.00	.047
Assam	2.83	2.02	3.97	<.001	5.26	3.70	7.48	<.001
Bihar	0.32	0.22	0.48	<.001	0.78	0.52	1.16	.221
Goa	2.73	1.04	7.14	.041	2.11	0.79	5.63	.136
Gujarat	2.06	1.50	2.83	<.001	2.16	1.55	3.01	<.001
Haryana	1.24	0.80	1.90	.337	1.31	0.84	2.05	.227
Himachal Pradesh	1.38	0.73	2.61	.314	1.47	0.77	2.79	.239
Jammu	2.72	1.74	4.26	<.001	3.80	2.39	6.03	<.001
Karnataka	0.51	0.34	0.77	.001	0.58	0.38	0.88	.011
Madhya Pradesh	1.00	0.72	1.39	.980	1.62	1.15	2.28	.006
Maharashtra	1.88	1.39	2.53	<.001	2.04	1.50	2.78	<.001

Manipur	4.78	2.52	9.06	<.001	5.28	2.72	10.24	<.001
Meghalaya	0.46	0.08	2.77	.395	0.72	0.12	4.47	.726
Mizoram	0.31	0.01	9.73	.502	0.30	0.01	9.51	.492
Nagaland	2.19	0.81	5.92	.122	3.03	1.07	8.57	.037
Orissa	1.60	1.13	2.26	.008	3.36	2.34	4.83	<.001
Punjab	2.76	1.95	3.91	<.001	2.34	1.62	3.37	<.001
Rajasthan	1.06	0.75	1.50	.751	1.73	1.20	2.49	.003
Sikkim	1.07	0.10	11.76	.953	1.15	0.10	13.59	.910
Tamil Nadu	4.93	3.69	6.57	<.001	6.28	4.64	8.51	<.001
West Bengal	2.16	1.60	2.91	<.001	3.42	2.50	4.68	<.001
Uttar Pradesh	1.51	1.12	2.02	.006	2.72	2.00	3.71	<.001
Delhi	4.62	3.24	6.58	<.001	2.83	1.95	4.10	<.001
Arunachal Pradesh	0.58	0.07	5.13	.624	0.85	0.09	7.60	.884
Tripura	3.19	1.79	5.68	<.001	4.59	2.54	8.26	<.001

Ref: Reference category; Dependent variable: Induced abortion (0 = No; 1 = Yes).

Table 5 Association between sex preference, sex composition of living children and induced abortion: high abortion states and low abortion states

Adjusted odds ratios with 95 percent confidence interval (95% CI) from logistic regression analysis showing association between sex preference, sex composition of living children and induced abortion among ever-married women aged 15-49 in Model 1 for high abortion states (Delhi, Punjab and Haryana) (n=8,023) and Model 2 for low abortion states (Andhra Pradesh, Karnataka and Kerala) (n=11,103), controlling for socio-economic, demographic and maternal characteristics, National Family Health Survey 2 (1998-99)

	Induced abortion									
	High abortion states: Model 1 (95% CI)					**Low abortion states: Model 2 (95% CI)**				
Predictor variables	**Odds ratio**	**LL**	**UL**	***P* value**	**Number of women**	**Odds ratio**	**LL**	**UL**	***P* value**	**Number of women**
Sex preference										
Wants equal son and daughter (ref)	1.00				5,568	1.00				9,306
Wants son more than daughter	1.16	0.88	1.52	.299	2,370	0.97	0.54	1.76	.927	1,505
Wants son less than daughter	1.36	0.55	3.36	.503	85	0.65	0.17	2.50	.532	292
Sex composition of living children										
1 child—1 son (ref)	1.00				649	1.00				980
1 child—no son	1.83	0.96	3.47	.064	489	1.30	0.53	3.20	.573	920
2 children—2 son	2.71	1.55	4.72	<.001	794	1.19	0.47	3.04	.716	926
2 children—1 son	2.12	1.24	3.63	.006	1,204	1.21	0.54	2.70	.645	1,850
2 children—no son	2.61	1.32	5.17	.006	263	1.02	0.36	2.93	.963	644
3+ children—2+ son	1.58	0.92	2.71	.096	2,732	1.56	0.70	3.47	.272	2,870
3+ children—1 son	1.92	1.09	3.37	.023	1,067	1.38	0.57	3.36	.480	1,323
3+ children—no son	2.03	0.79	5.21	.143	143	1.32	0.32	5.46	.698	302
No living child(ren)	0.30	0.11	0.82	.019	682	1.24	0.52	2.97	.631	1,288
Age at effective marriage										
<18 years (ref)	1.00				2,948	1.00				6,686
18-21 years	0.95	0.67	1.37	.799	3,738	0.51	0.28	0.93	.029	3,061
22+ years	1.04	0.78	1.38	.804	1,337	0.82	0.49	1.40	.476	1,356
Type of residence										
Rural (ref)	1.00				3,981					3,341
Urban	2.06	1.52	2.80	<.001	4,042	0.90	0.58	1.40	.650	7,762
Religion										
Hindu (ref)	1.00				5,751	1.00				8,629
Muslims	1.09	0.58	2.04	.785	367	0.78	0.42	1.44	.425	1,647
Others	1.41	1.08	1.84	.011	1,905	1.32	0.72	2.44	.373	827
Caste/tribe										

Scheduled caste (ref)	1.00				1,781	1.00				1,729
Scheduled tribes	3.25	0.76	13.88	.112	24	7.05	2.41	20.59	.000	469
Other backward class	0.77	0.50	1.20	.251	1,454	1.86	0.78	4.44	.162	4,794
Other castes	1.06	0.76	1.48	.747	4,764	2.16	0.90	5.20	.085	4,111
Couple's education										
Both illiterate (ref)	1.00				1,374	1.00				3,018
Only husband literate	1.85	1.03	3.32	.038	1,954	1.39	0.67	2.91	.380	2,230
Only wife literate	2.47	1.05	5.79	.037	224	1.59	0.53	4.74	.406	497
Both literate	2.45	1.36	4.41	.003	4,471	1.32	0.61	2.85	.477	5,358
Couple's working status										
Both not working (ref)	1.00				130	1.00				174
Either husband or wife working	4.89	0.67	35.55	.116	6,823	0.57	0.19	1.68	.309	5,798
Both working	7.05	0.96	51.89	.055	1,070	0.69	0.22	2.11	.510	5,131
Mass media exposure										
No exposure (ref)	1.00				1,612	1.00				2,500
Partial exposure	1.54	0.92	2.56	.098	4,715	1.23	0.61	2.49	.565	6,207
Full exposure	1.33	0.75	2.35	.332	1,696	1.16	0.50	2.66	.728	2,396
Autonomy										
Low (ref)	1.00				2,528	1.00				2,937
Medium	1.44	1.05	1.98	.023	2,149	1.22	0.73	2.04	.440	3,625
High	1.33	0.99	1.77	.055	3,346	1.06	0.64	1.76	.809	4,541
Wealth index										
Lowest (ref)	1.00				42	1.00				1,377
Second	0.29	0.03	2.75	.284	230	1.24	0.34	4.46	.742	1,706
Middle	0.24	0.04	1.67	.150	956	2.75	0.88	8.61	.083	2,405
Fourth	0.37	0.06	2.40	.297	2,279	3.07	0.93	10.13	.065	3,094
Highest	0.55	0.08	3.63	.534	4,516	6.76	1.94	23.52	.003	2,521

Ref: Reference category; Dependent variable: Induced abortion (0 = No; 1 = Yes).

Table 6 Specific reproductive health problems

Specific reproductive health problems among ever-married women aged 15-49 years, according to number of induced abortions, India, National Family Health Survey 2 (1998-99)

	Number of induced abortions			
Reproductive health problems	**None**	**One**	**2 or more**	χ^2 ***P* value**
Any abnormal vaginal discharge	29.6	36.2	39.9	<.001
Vaginal discharge accompanied by:				
Itching /Irritation	17.0	21.2	21.1	<.001
Bad odour	11.3	13.1	15.5	.001
Severe lower abdominal pain[a]	18.6	20.8	29.1	<.001

Fever	8.1	8.9	13.0	.001
Other problems	8.0	10.5	11.0	<.001
Symptoms of a urinary tract infection[b]	17.6	20.2	26.6	<.001
Any abnormal vaginal discharge or symptoms of a urinary tract infection	35.4	41.9	48.1	<.001
Intercourse related problems:				
Pain during intercourse	12.4	16.7	19.3	<.001
Blood visible after sex	2.3	2.6	1.8	.524
Any of the above reproductive health problems	38.5	45.8	51.6	<.001
Number of women	87,913	1,991	399	

a Not related to menstruation.

b Includes pain or burning sensation while urinating or difficult or frequent urination.

Table 7 Associations between any reproductive health problem and induced abortion

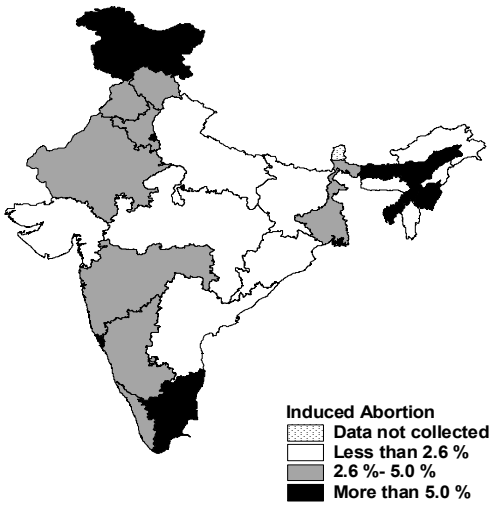
Unadjusted and adjusted odds ratios with 95% CI from logistic regression analysis showing associations between any reproductive health problem and induced abortion, controlling for socioeconomic, demographic, and maternal characteristics among ever-married women aged 15-49 years, India, National Family Health Survey 2 (1998-99) (n = 89,141)

	Reproductive health problem							
	Unadjusted (95% CI)				**Adjusted (95% CI)**			
Predictor variables	**Odds ratio**	**LL**	**UL**	***P* value**	**Odds ratio**	**LL**	**UL**	***P* value**
Number of induced abortions								
None (ref)								
One	1.35	1.24	1.48	<.001	1.46	1.33	1.60	<.001
More than one	1.71	1.40	2.08	<.001	1.85	1.52	2.27	<.001
Number of children ever born								
0 (ref)								
1-2	0.81	0.78	0.85	<.001	0.71	0.67	0.75	<.001
3	0.88	0.84	0.93	<.001	0.76	0.71	0.81	<.001
4+	0.92	0.88	0.96	<.001	0.80	0.75	0.86	<.001
Time since last birth								
Less than 1 year (ref)								

1-2 years	1.14	1.09	1.20	<.001	1.14	1.08	1.20	<.001
More than 2 years	1.15	1.10	1.20	<.001	1.34	1.27	1.41	<.001
Current age								
15-24 years (ref)								
25-34 years	1.10	1.07	1.14	<.001	1.05	1.01	1.10	.018
35 years or more	0.85	0.82	0.88	<.001	0.76	0.72	0.80	<.001
Type of residence								
Rural (ref)								
Urban	0.87	0.84	0.90	<.001	0.98	0.95	1.02	.404
Religion								
Hindu (ref)								
Muslims	1.53	1.47	1.60	<.001	1.59	1.52	1.66	<.001
Others	0.98	0.92	1.04	.471	1.03	0.97	1.09	.390
Caste/tribe								
Scheduled caste (ref)								
Scheduled tribes	1.01	0.97	1.05	.671	1.03	0.99	1.08	.107
Other backward class	1.12	1.06	1.17	<.001	1.14	1.08	1.20	<.001
Other castes	0.91	0.88	0.94	<.001	0.93	0.89	0.96	<.001
Couple's education								
Both illiterate (ref)								
Only husband literate	1.00	0.96	1.03	.893	1.02	0.99	1.06	.231
Only wife literate	0.99	0.92	1.07	.841	0.97	0.89	1.05	.420
Both literate	0.86	0.84	0.89	<.001	0.99	0.94	1.03	.513
Couple's working status								
Both not working (ref)								
Only husband working	1.08	0.98	1.20	.125	1.07	0.96	1.18	.216
Only wife working	1.17	0.99	1.39	.069	1.22	1.02	1.45	.028
Both working	1.15	1.04	1.27	.007	1.12	1.01	1.24	.037
Mass media exposure								
No exposure (ref)								
Partial exposure	1.00	0.97	1.03	.869	1.09	1.06	1.13	<.001
Full exposure	0.76	0.73	0.80	<.001	0.98	0.93	1.04	.567
Autonomy								
Low (ref)								
Medium	0.97	0.94	1.00	.044	0.97	0.94	1.00	.066
High	0.85	0.82	0.88	<.001	0.89	0.86	0.92	<.001
Wealth index								
Lowest (ref)								
Second	1.04	0.99	1.08	.085	1.05	1.00	1.10	.030
Middle	1.06	1.01	1.10	.010	1.06	1.01	1.11	.015
Fourth	0.99	0.95	1.04	.726	0.99	0.94	1.04	.615
Highest	0.76	0.73	0.80	<.001	0.79	0.74	0.85	<.001

Ref: Reference category; Dependent variable: any reproductive health problems (0 = No; 1 = Yes).

Map 1 Induced abortion among women in India, 1992-93



Map 2 Induced abortion among women in India, 1998-99