

DETERMINANTS OF INDUCED ABORTION: AN ANALYSIS OF INDIVIDUAL, HOUSEHOLD AND CONTEXTUAL FACTORS IN RAJASTHAN, INDIA

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Summary. In the developing world, little is known about the risk and precipitating factors for abortion, due to a dearth of community-based surveys. Most analyses of determinants of induced abortion consider only a small set of household and individual socio-demographic factors and treat abortion as an isolated outcome, which ignores its relationship with prior reproductive health behaviours and experiences. In this paper, data from a cross-sectional survey of abortion knowledge, attitudes and practices among 2571 currently married women of reproductive age in Rajasthan, India, were used to examine contextual-, household- and individual-level determinants of abortion. Bivariate probit models, which jointly determine the probability of pregnancy and the conditional probability of abortion, were used to reflect the probability of abortion as a result of interrelated and sequential events. Increased socioeconomic status and life-cycle factors were associated with both the probability of pregnancy and with the conditional likelihood of abortion. Women who reported personal networks were also more likely to terminate pregnancies, particularly if their network members purportedly had abortion experience. Community knowledge of sex-selective abortion also exerted a significant positive effect on the propensity to terminate a pregnancy. For rural women only, community beliefs regarding spousal consent requirements pre-abortion were also significantly associated with abortion.

Introduction

Little is known about the risk and precipitating factors for abortion in developing countries, where community-based surveys on abortion are rare. Existing studies have generally considered a small set of potential household and individual socio-demographic determinants of abortion, and have treated abortion as an isolated outcome, ignoring its relationship with prior reproductive health behaviours and experiences (Nair & Kurup, 1985; Shapiro & Tambashe, 1994; Ping & Smith, 1995;

Agadjanian & Qian, 1997; Ahmed *et al.*, 1998; Babu *et al.*, 1998; Okonofua *et al.*, 1999; Ahiadeke, 2001; Bairagi, 2001; Calvès, 2002; Geelhoed *et al.*, 2002; Guillaume & Desgrees du Lou, 2002; Razzaque *et al.*, 2002; Bose & Trent, 2005; Malhotra *et al.*, 2003; DaVanzo *et al.*, 2004a, 2004b). Using data from a large cross-sectional survey of abortion knowledge, attitudes and practices in Rajasthan, India, this paper makes two new and important contributions to this literature. First, the relationship between contextual-level factors and abortion are examined, in addition to household- and individual-level factors. Second, the probability of pregnancy and the conditional probability of induced abortion are jointly modelled, thus better reflecting abortion as the result of sequential and interrelated behaviours and events.

Conceptual framework

As there are no known conceptual frameworks for the determinants of induced abortion in developing countries, a developed country model was adapted, as shown in Fig. 1 (Rossier *et al.*, 2007). Three aspects of this model are important for the current analysis. First, the probability of abortion is decomposed into a chain of interrelated and sequential events and behaviours, each with its own risk factors, which are analysed simultaneously. In doing so, these events and behaviours are assumed to be jointly determined with the decision to have an abortion, as supported by previous literature (Kane & Staiger, 1996; DaVanzo *et al.*, 2004a). Second, the model assumes pregnancies reported as both intended and unintended may end in induced abortion; for example, originally intended pregnancies may be terminated following sex determination tests. Third, abortion and its antecedent events are determined by contextual, household and individual characteristics. Included under contextual factors are norms concerning sexuality, family size, contraception and induced abortion, as well access to, and quality of care of, abortion and family planning services. At the household and individual levels, the primary determinants are socioeconomic and life-cycle factors. The developing country community-based literature on the impact of each of these factors on induced abortion is summarized below.

Determinants of abortion

Contextual-level effects. While there is significant research on the effect of contextual factors on induced abortion in developing countries, particularly the United States (Lundberg & Plotnick, 1990; Currie *et al.*, 1996; Joyce & Kaestner, 1996; Argys *et al.*, 2000; Brown *et al.*, 2001), only two developing country studies have considered such factors (Ping & Smith, 1995; Rahman *et al.*, 2001). The first study was conducted in China, and found a decreased likelihood of pregnancy termination in counties where enforcement of national family size policies was relaxed compared with those with strict enforcement, even after controlling for individual and household factors (Ping & Smith, 1995). The second study, conducted in Matlab, Bangladesh, found significantly lower abortion rates in areas with better family planning services, although this was attributed to a decrease in unintended pregnancy

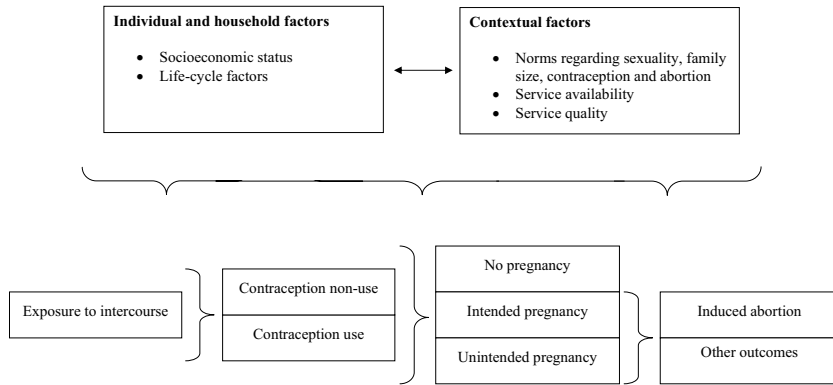


Fig. 1. Conceptual framework for determinants of induced abortion and its antecedent event.

rates, rather than to a difference in the propensity to abort unintended pregnancies (Rahman *et al.*, 2001).

Household- and individual-level effects. Relative to contextual factors, the literature on effects of household and individual factors on induced abortion in developing countries is extensive. These studies have repeatedly highlighted socioeconomic factors as important determinants of induced abortion. Household standard of living, education, employment and caste have shown a consistently positive relationship with the likelihood of abortion (Nair & Kurup, 1985; Shapiro & Tambashe, 1994; Agadjanian & Qian, 1997; Ahmed *et al.*, 1998; Babu *et al.*, 1998; Okonofua *et al.*, 1999; Ahiadeke, 2001; Calvès, 2002; Geelhoed *et al.*, 2002; Guillaume & Degrees du Lou, 2002; Razzaque *et al.*, 2002; Bose & Trent, 2005; Malhotra *et al.*, 2003; DaVanzo *et al.*, 2004a, 2004b). Urban residence has shown a positive relationship with abortion in four of the six studies considering this measure of socioeconomic status and no relationship in the others, raising the question of whether urbanization is a proxy for improved socioeconomic status or other unmeasured factors, including differential access to services (Babu *et al.*, 1998; Okonofua *et al.*, 1999; Ahiadeke, 2001; Geelhoed *et al.*, 2002; Bose & Trent, 2005; Malhotra *et al.*, 2003).

Life-cycle factors are also important individual-level predictors of abortion in developing countries. Most studies show an increase in the odds of abortion with increasing age, sometimes followed by a decrease in the late reproductive years, with exceptions in studies of adolescents or in settings where pre-marital intercourse is more common (Shapiro & Tambashe, 1994; Alvarez *et al.*, 1999; Ahiadeke, 2001; Calvès, 2002; Guillaume & Degrees du Lou, 2002; Razzaque *et al.*, 2002; Bose & Trent, 2005; DaVanzo *et al.*, 2004a, 2004b). Studies have also linked increased parity to pregnancy termination (Ping & Smith, 1995; Ahmed *et al.*, 1998; Ahiadeke, 2001; Bairagi, 2001; Calvès, 2002; Malhotra *et al.*, 2003; DaVanzo *et al.*, 2004a), and in Asia, son preference (Ping & Smith, 1995; Bairagi, 2001; Malhotra *et al.*, 2003). Family spacing or limiting desires and short pregnancy intervals have also been

associated with increased odds of abortion (Ahmed *et al.*, 1998; Razzaque *et al.*, 2002; Malhotra *et al.*, 2003; DaVanzo *et al.*, 2004a, 2004b).

The effect of women's autonomy on the propensity to terminate a pregnancy has received surprisingly little attention in the developing country literature. Two studies that included measures of women's autonomy, however, found it to be an important individual-level predictor of, and positively associated with, abortion (Akin, 1999; Malhotra *et al.*, 2003).

While the conceptual framework used in this paper posits that contraceptive use is jointly determined with sexual activity, pregnancy and abortion, most studies treat it as an exogenous variable. Cross-sectional studies have shown a consistently strong and positive association between current- and ever-use of contraception and induced abortion (Alvarez *et al.*, 1999; Okonofua *et al.*, 1999; Razzaque *et al.*, 2002; Bose & Trent, 2005). Studies considering time-varying measures of contraceptive use suggest that this relationship reflects strong pre-pregnancy desires to control fertility among women undergoing abortions (Malhotra *et al.*, 2003; DaVanzo *et al.*, 2004a).

Methods

Setting and data source

This study was conducted in the rural north-western Indian state of Rajasthan, one of India's least developed states. According to the latest National Family Health Survey (NFHS), only one-third of females aged ≤ 6 are literate. Marriage is nearly universal and occurs early. Fertility has declined little in the past decade, and the total fertility rate of 3.8 children per woman is roughly 30% higher than the national average (IIPS & ORC Macro, 2000). Son preference is believed to be pervasive, and to result in selective abortion of female fetuses and a skewed child sex ratio (Census of India, 2002).

In Rajasthan, like elsewhere in India, women have been entitled to legal abortion services during the first 20 weeks of pregnancy for medical and social reasons since the Medical Termination of Pregnancy (MTP) Act of 1971 was enacted (Government of India, 1971). Despite the existence of a seemingly liberal abortion policy, deficiencies in its implementation contribute to the continued predominance of illegal abortions in India. Access to approved facilities is poor, particularly in rural areas (Khan *et al.*, 1999). The quality of legal services is hindered by inadequately trained providers, pervasive infrastructure problems, poor treatment of clients and a lack of counselling (Johnston, 2002). Mis-perceptions regarding abortion legality are widespread among women, men and even providers (Sheriar, 2001; Malhotra *et al.*, 2003; Elul *et al.*, 2004). Ultimately, 60–90% of the annual 6 million abortions estimated in India are believed to be illegal, and unsafe abortions account for significant mortality and morbidity (Chhabra & Nuna, 1994; Sood *et al.*, 1995; Johnston, 2002; Duggal & Ramachandran, 2004; Ganatra, 2000a, 2000b; Johnston, 2002; Sedgh *et al.*, 2007).

The data for this analysis come from a 2001 Population Council Abortion Knowledge, Attitudes and Practices survey conducted in six districts of Rajasthan (Elul *et al.*, 2004). Multi-stage stratified cluster sampling was used to select a sample of 3682 ever-married women aged 15–44 in district headquarters, villages and towns

lying within a 25 km radius of the district headquarters, as well as one pre-selected town per district and villages lying within a 5 km radius of those towns. Ultimately, 3266 (89%) of the 3682 eligible women identified were interviewed. This paper includes data from the 2571 (79%) currently married women at risk of pregnancy and abortion during the five years preceding the survey. Woman- and pregnancy-based data are combined such that women who had no or one pregnancy in the five-year reference period appear in the dataset once, while those with more than one pregnancy appear in the dataset multiple times, corresponding to the total number of pregnancies they reported in the reference period. The final sample consists of 3861 observations.

Analytical approach

Combining woman- and pregnancy-based data permits simultaneous modelling of two of the four principal antecedent events or behaviours depicted in Fig. 1: namely pregnancy and abortion. While the conceptual framework suggests that abortions may result from both unintended and intended pregnancies, due to the small number of abortions in the sample, these probabilities were not modelled separately. Instead, abortion was conditioned on all pregnancies, regardless of intentions.

A maximum likelihood bivariate probit model with selection was used to jointly identify the determinants of whether or not a woman has a pregnancy, and whether those pregnancies end in induced abortion or another outcome (i.e. live birth, spontaneous abortion or still-birth). Following the conceptual framework, this model allows explicit correlation between the two dependent variables, as well as for the censoring process, thus accounting for potentially significant endogeneity between them (Greene, 2003). As the model fits two equations simultaneously, the parameters that govern the determination of whether a woman has a pregnancy can differ from those that govern whether the pregnancy ends in abortion, thus accommodating a key aspect of the conceptual framework. In other words:

- (1) $y_{1j} = (x_{1j}'\beta_1 + \mu_{1j} > 0)$, for the pregnancy selection model;
- (2) $y_{2j} = (x_{2j}'\beta_2 + \mu_{2j} > 0)$, for the abortion model;

where:

$$\begin{aligned}\mu_{1j} &\sim N(0, \sigma); \\ \mu_{2j} &\sim N(0, 1); \\ \text{corr}(\mu_{1j}, \mu_{2j}) &= \rho;\end{aligned}$$

and y_{2j} is only observed if, and only if, $y_{1j} > 0$.

All analyses account for clustering at the primary sampling unit (PSU), household and respondent levels, and were performed using STATA 7.0.

At the individual level, five variables were included: time-varying measures of the respondent's age, number of living children and number of living sons, as well as religion, and the strength of the respondent's personal networks. To assess personal network respondents were first asked to list (but not name) up to five ever-married women aged 15–44 with whom they discuss important matters and share secrets; and if they listed at least one such network member, they were then asked whether each

network member had attempted abortion in the five years preceding the survey. As studies have documented an association between fertility regulation and both social interaction generally and social interaction regarding family planning specifically (Entwisle *et al.*, 1996; Montgomery & Casterline, 1996; Kohler, 1997; Kohler *et al.*, 2001; Madhavan *et al.*, 2003; Feyisetan *et al.*, 2003), this variable was categorized to reflect both whether respondents had personal networks, and if so, whether those networks included women who purportedly had attempted abortion in the reference period. The presence of a personal network in itself was hypothesized to be positively associated with the likelihood of abortion, even if those network members had purportedly not attempted abortion, and a stronger relationship was expected if those networks included women with abortion experience.

At the household level, two variables were considered: standard of living and area of residence. The standard of living index was calculated following the NFHS approach, which considers eleven different aspects of household wealth (IIPS & ORC Macro, 2000). Area of residence was based on census definitions.

At the contextual level, five variables were constructed by aggregating individual responses to questions regarding individual education, modern temporary contraceptive use, knowledge of abortion legislation, and familiarity with sex-selective abortion to the PSU level. In some cases, measuring these variables at the community level bypassed potentially endogeneity that would occur if they were measured at the individual level. For example, if individual-level knowledge of abortion legality was positively associated with induced abortion, it would be difficult to discern whether women who are more knowledgeable about abortion legality have more abortions or whether women who have abortions are more likely to learn abortion is legal. As increased community education has been associated with lower fertility and increased use of contraception, net of individual-level factors (Kravdal, 2002; Moursund & Kravdal, 2003), it was expected to be positively correlated with abortion. Since time-varying data on contraceptive use at the individual level were not available, community-level prevalence of spacing methods at the time of the survey was included among the independent variables. This measure provides an indication of community desires to control fertility, and also, as community-level contraceptive prevalence is arguably more stable over time than individual use, serves as a proxy for contraceptive use at the start of the reference period. Community-level knowledge of abortion legality and beliefs regarding whether husband's consent is required pre-abortion capture different perceptions of abortion access that may deter women in India from terminating pregnancies (Ganatra, 2000a). Since widely publicized legislative proscriptions on sex determination tests are likely to lead to under-reporting of sex-selective abortions, community-level knowledge of sex-selective abortions by others serves as a proxy for the prevalence of such abortions in a given community.

Results

Table 1 describes the background characteristics of the 2571 women at risk of pregnancy (and hence abortion) during the five years preceding the survey, the 1809

who had at least one pregnancy during the reference period, and the 202 who reported at least one abortion in that period.

Table 2 provides the coefficients from the bivariate probit selection model for the entire sample. In Model 1, which shows the effects of household and individual variables on the risk of pregnancy and the conditional risk of abortion, life-cycle factors are significantly related to the probability of pregnancy and to the conditional probability of abortion, albeit the latter to a lesser degree. While the probability of pregnancy peaks for women aged 25–34, age is positively related to abortion. Increasing parity is negatively correlated with pregnancy and positively correlated with abortion conditional on pregnancy. While the number of living sons is also negatively associated with pregnancy, it has no significant relationship with the likelihood of a pregnancy being terminated. As expected, socioeconomic status is associated with both outcomes. Women of high socioeconomic status and urban women are less likely than their low and middle socioeconomic status and rural counterparts, respectively, to become pregnant; once pregnant, though, they are more likely to abort. Higher individual educational attainment, however, is associated with a decreased probability of pregnancy but not significantly associated with pregnancy termination. While personal networks have no effect on the likelihood of pregnancy, as hypothesized, women with personal networks are significantly more likely to terminate their pregnancies, particularly if their networks include women with abortion experience.

In Model 2, community-level education and contraceptive use are added to the pregnancy equation and all five community-level variables are added to the abortion equation. No community effects emerge in the pregnancy model and only a single marginally significant effect is observed in the abortion model: pregnancies are more likely to be terminated as more women in the community know someone who has had a sex-selective abortion. Inclusion of the community-level variables, however, reduces the rural–urban differential in both models, so much so that residence is no longer significantly related to either outcome variable. Similarly, individual-level educational differences in the propensity to get pregnant disappear once the community-level variables are added.

Since rural India is characterized by poorer access to abortion and minimal familiarity with abortion legislation, the meaning of the contextual factors may vary by geographic area. Table 3 explores the effects of individual, household and contextual variables on induced abortion in urban versus rural areas. Using the same variables as in the final model for the total sample, some of the previously observed relationships for household and individual factors persist in both areas. Women aged 25–34 remain the most likely to become pregnant, and increasing age is still strongly positively associated with a pregnancy being terminated in both geographic areas. Religion continues to have no effect on either outcome. The effects of other variables, however, differ across the geographic sub-samples. For urban women, increased parity and number of living sons are both inversely related to pregnancy and not significantly associated with termination. Among rural women, increased parity negatively affects the propensity to get pregnant but positively affects the likelihood of abortion, while the number of living sons has no significant relationship with either outcome. Similarly, household standard of living shows a strong inverse relationship with pregnancy risk among urban women but not in the rural sample. Its effect on

Table 1. Percentage distribution of respondents at risk of pregnancy, reporting at least one pregnancy, and reporting at least one abortion in the five years preceding the survey

	At risk of pregnancy	At least one pregnancy	At least one abortion
Percentage of all women at risk of pregnancy five years preceding the survey (<i>n</i>)	100.0 (2571)	69.7 (1791)	7.9 (202)
Woman and household variables			
Age ^a			
≤24 years	60.4	67.4	51.5
25–34 years	31.6	29.4	44.1
35–44 years	8.0	3.2	4.4
Number of living children ^a			
0–1 children	53.8	56.2	38.6
2 or more children	46.2	43.8	61.4
Number of living sons (mean) ^a	0.9	0.8	1.2
Education			
Below secondary schooling	74.2	76.4	64.4
Some secondary schooling or more	25.8	23.6	35.6
Personal network			
Does not have personal network	22.0	21.2	15.1
Has personal network with no abortion experience	73.9	74.3	78.2
Has personal network with abortion experience	4.1	4.2	6.7
Caste/tribe			
Scheduled caste/scheduled tribe	29.0	30.6	25.3
Other backward caste	39.3	39.3	31.7
Upper caste	31.7	30.1	43.0
Religion			
Hindu	81.7	82.2	81.2
Non-Hindu	18.3	17.8	18.8
Household standard of living index			
Low	27.8	30.7	14.4
Medium	37.8	38.6	37.6
High	34.4	30.7	48.0
Geographic residence area			
Rural	41.5	44.8	23.8
Urban	58.5	55.2	76.2
Contextual variables			
Mean years of completed education	3.2	2.9	4.2
Women currently using modern contraception (%)	41.5	40.2	47.1
Women who know that abortion is legal (%)	15.4	15.2	16.9
Women who believe husband's consent is mandated by law (%)	77.7	77.9	74.7
Women who know someone who had a sex-selective abortion (%)	53.2	52.3	62.2

^aAt start of reference period.

Table 2. Bivariate probit estimates of pregnancy and abortion in the five years preceding the survey for total sample

	Model 1						Model 2					
	Pregnancy			Abortion			Pregnancy			Abortion		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
Woman and household variables												
Age ^a												
≤24 years (ref.)	0.000			0.000			0.000			0.000		
25–34 years	0.525	0.064	<0.001	0.695	0.090	<0.001	0.536	0.064	<0.001	0.698	0.092	<0.001
35–44 years	0.039	0.098	0.689	1.027	0.147	<0.001	0.045	0.098	0.649	1.037	0.147	<0.001
Number of living children ^a	-0.495	0.034	<0.001	0.196	0.087	0.025	-0.491	0.034	<0.001	0.194	0.085	0.023
Number of living sons ^a	-0.227	0.057	<0.001	0.036	0.117	0.756	-0.229	0.056	<0.001	0.050	0.116	0.664
Education												
Below secondary schooling (ref.)	0.000			0.000			0.000			0.000		
Some secondary schooling or more	-0.173	0.083	0.038	-0.024	0.110	0.829	-0.093	0.093	0.315	-0.053	0.128	0.679
Personal network												
No personal network (ref.)	0.000			0.000			0.000			0.000		
Personal network with no abortion experience	0.039	0.074	0.603	0.250	0.107	0.020	0.026	0.075	0.725	0.263	0.109	0.016
Personal network with abortion experience	0.233	0.156	0.137	0.468	0.199	0.019	0.215	0.157	0.172	0.478	0.205	0.020
Religion												
Hindu (ref.)	0.000			0.000			0.000			0.000		
Non-Hindu	0.036	0.078	0.642	-0.107	0.100	0.284	0.020	0.079	0.800	-0.111	0.100	0.268
Household standard of living index												
Low (ref.)	0.000			0.000			0.000			0.000		
Medium	-0.142	0.077	0.064	0.443	0.113	<0.001	-0.128	0.077	0.095	0.434	0.112	<0.001
High	-0.321	0.090	0.000	0.661	0.142	<0.001	-0.264	0.094	0.005	0.620	0.139	<0.001

Table 2. Continued

	Model 1						Model 2					
	Pregnancy			Abortion			Pregnancy			Abortion		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
Household residence area												
Rural (ref.)	0.000			0.000			0.000			0.000		
Urban	-0.202	0.072	0.005	0.330	0.098	0.001	-0.096	0.081	0.234	0.172	0.125	0.167
Contextual variables												
Mean years of completed education							-0.022	0.015	0.142	-0.011	0.022	0.629
Women currently using modern contraception (%)							-0.322	0.259	0.214	0.367	0.336	0.275
Women who know that abortion is legal (%)										-0.133	0.353	0.705
Women who believe husband's consent is mandated by law (%)										-1.305	1.021	0.201
Women who know someone who had a sex-selective abortion (%)										0.531	0.281	0.059
<i>N</i>		3857			3079			3857			3079	
Log pseudo likelihood		-2196.504						-2187.285				

^aAt start of reference period or before the index pregnancy if the woman had ≥ 1 pregnancy.

the likelihood of a pregnancy ending in abortion, however, is stronger among rural women. Additionally, the effect of personal networks on the likelihood of a pregnancy ending in abortion is evident only for rural women and is particularly strong when their networks include women with abortion experience.

The contextual variables remain largely non-significant in both the pregnancy and abortion models once the data are disaggregated by geographic area. The previously observed association between community knowledge of sex-selective abortion behaviours among others and pregnancy termination is not significant in either area. Among rural women, however, community-level beliefs regarding whether husband's consent is required to obtain an abortion emerges as the strongest predictor of a pregnancy being aborted: the greater the proportion of women in the community who incorrectly believe that husband's consent is required pre-abortion, the less likely rural women are to terminate their pregnancies.

Discussion

This paper examined contextual-, household- and individual-level determinants of induced abortion using data from a large community-based abortion knowledge, attitudes and practice survey. Using a model that accounts for endogeneity between abortion and pregnancy, the probability of abortion was decomposed into two sequential but interrelated behaviours and events. This approach provides a more methodologically rigorous analysis of the determinants of this important method of fertility control. Of particular significance is the finding that rural women who report sharing important and private matters with other ever-married women of reproductive age are more likely to terminate pregnancies, particularly if their networks include women who purportedly had abortions. While there are significant data demonstrating the impact of social interaction on contraceptive use in developing countries (Entwisle *et al.*, 1996; Montgomery & Casterline, 1996; Kohler, 1997; Kohler *et al.*, 2001; Madhavan *et al.*, 2003; Feyisetan *et al.*, 2003), this is the first study to document the effect of such interaction on abortion. More attention should be directed to studying the relationship between social interaction and the likelihood of abortion.

Other results reaffirm the role of individual-level socioeconomic status and life-cycle factors in predicting abortion behaviour. They also provide additional evidence of where in the conditional chain of events leading to abortion these factors exert their influence. In particular, women's age, parity and household standard of living were strongly associated with both pregnancy and abortion. The number of living sons impacted fertility solely by decreasing the likelihood of pregnancy, which is surprising given the skewed child sex ratios in Rajasthan (Census of India, 2002). Several analyses of abortion determinants in India have documented a direct relationship between son preference and abortion (Bose & Trent, 2005; Malhotra *et al.*, 2003), suggesting that women in the survey may have under-reported pregnancies of female fetuses. Additionally, while there was evidence of rural-urban differentials in the propensity to abort in the initial analysis, these differences disappeared after controlling for community-level factors, suggesting that geographic residence is a proxy for access to services rather than a direct measure of socioeconomic status.

Table 3. Bivariate probit estimates of pregnancy and abortion in the five years preceding the survey, by geographic area

	Urban						Rural					
	Pregnancy			Abortion			Pregnancy			Abortion		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
Woman and household variables												
Age ^a												
≤24 years (ref.)	0.000			0.000			0.000			0.000		
25–34 years	0.564	0.086	<0.001	0.755	0.098	<0.001	0.566	0.093	<0.001	0.603	0.160	<0.001
35–44 years	0.035	0.137	0.799	1.118	0.171	<0.001	0.127	0.137	0.356	0.893	0.270	0.001
Number of living children ^a	-0.500	0.044	<0.001	0.113	0.091	0.216	-0.499	0.051	<0.001	0.295	0.133	0.027
Number of living sons ^a	-0.337	0.078	<0.001	0.103	0.124	0.407	-0.080	0.082	0.332	-0.026	0.202	0.896
Education												
Below secondary schooling (ref.)	0.000			0.000			0.000			0.000		
Some secondary schooling or more	-0.144	0.102	0.157	0.031	0.132	0.813	0.356	0.276	0.196	-0.281	0.316	0.375
Personal network composition												
Does not have personal network (ref.)	0.000			0.000			0.000			0.000		
Has personal network with no abortion experience	-0.033	0.103	0.746	0.230	0.132	0.081	0.095	0.109	0.380	0.351	0.208	0.091
Has personal network with abortion experience	0.058	0.195	0.766	0.350	0.232	0.132	0.487	0.271	0.072	0.798	0.369	0.030
Religion												
Hindu (ref.)	0.000			0.000			0.000			0.000		
Non-Hindu	-0.047	0.091	0.607	-0.103	0.107	0.337	0.234	0.200	0.240	-0.366	0.321	0.254
Household standard of living index												
Low (ref.)	0.000			0.000			0.000			0.000		
Medium	-0.295	0.128	0.022	0.324	0.147	0.027	-0.045	0.099	0.650	0.517	0.170	0.002
High	-0.452	0.138	0.001	0.481	0.161	0.003	-0.249	0.142	0.080	0.749	0.232	0.001

Table 3. Continued

	Urban						Rural					
	Pregnancy			Abortion			Pregnancy			Abortion		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
Contextual variables												
Mean years of completed education	-0.024	0.017	0.145	-0.025	0.023	0.274	0.112	0.055	0.044	0.069	0.090	0.440
Women currently using modern contraception (%)	-0.234	0.365	0.522	0.605	0.419	0.149	-0.643	0.373	0.085	0.294	0.531	0.580
Women who know that abortion is legal (%)				0.168	0.432	0.698				-0.572	0.584	0.327
Women who believe husband's consent is mandated by law (%)				-0.389	1.213	0.748				-3.663	1.455	0.012
Women who know someone who has had a sex-selective abortion (%)				0.372	0.372	0.317				0.683	0.496	0.168
<i>N</i>		2179			1664			1678			1415	
Log pseudo likelihood		-1369.367						-790.611				

^aAt start of reference period or before the index pregnancy if the woman had ≥ 1 pregnancy.

Note: All *p* values are from the *z*-test; ref.=reference group; estimates take into clustering by household and by woman.

In contrast to the literature on the importance of community effects on other health outcomes and behaviours (von Korff *et al.*, 1992; Diez-Roux, 1998), particularly of reproductive nature (Entwisle *et al.*, 1984, 1989; Degraff *et al.*, 1997; Mroz *et al.*, 1999; Katende *et al.*, 2003; Kravdal, 2002; Stephenson & Tsui, 2002; Koenig *et al.*, 2003; Moursund & Kravdal, 2003; Stephenson & Tsui, 2003; Koenig *et al.*, 2006), this study found little support for community effects on either pregnancy or abortion. Only two community-level variables were significantly associated with either outcome: increased community knowledge of sex-selective behaviours among others was positively associated with abortion among pregnant women in the total sample, and increased community misperceptions regarding husband's consent pre-abortion was negatively associated with pregnancy termination in the rural sub-sample. In the latter case, however, the effect estimate was highly significant and was by far the largest observed, underscoring the importance of community-level beliefs regarding consent requirements in deterring women from terminating their pregnancies. This finding is particularly worrisome as access to abortion services is already poor in rural India.

As few community-level effects on abortion were found, abortion may be determined largely at the individual level in Rajasthan. Indeed, a previous analysis of the determinants of abortion in several north Indian states, including Rajasthan, concluded that abortion behaviour in those states largely reflected women's individual characteristics as compared with several southern Indian states (Bose & Trent, 2005). Before supporting this conclusion, however, further efforts are needed to develop relevant community- and contextual-level variables. Direct measures of access to, and quality of, services have been shown to determine other reproductive health outcomes in developing countries (Entwisle *et al.*, 1984, 1989; Degraff *et al.*, 1997; Mroz *et al.*, 1999; Katende *et al.*, 2003; Stephenson & Tsui, 2002; Stephenson & Tsui, 2003; Tuoane *et al.*, 2003) and should be included in future analyses of determinants of abortion. While abortion providers may be reluctant to share the requisite information in facility surveys, women can report on providers and facilities in community-based studies.

Several study limitations should be noted. First, despite efforts to elicit complete pregnancy histories, under-reporting of pregnancies and induced abortions, and mis-reporting of induced abortions as spontaneous abortions or still-births, may have occurred. Thus, it is possible that the observed positive association between socioeconomic status and abortion may reflect a greater willingness of women of higher socioeconomic status to report abortions, and not true differences in levels of abortion. Second, given the cross-sectional nature of the data, several issues of causal and temporal ordering could not be definitively sorted out, particularly among the individual-level variables that were modelled as fixed across time. Additionally, the data do not permit exploration of several key steps in the chain to abortion as depicted in the conceptual framework, most notably sexual activity and individual-level contraceptive use pre-pregnancy. Due to the small numbers of abortions in the data, probabilities of unintended pregnancies and intended pregnancies could not be modelled separately and had to condition abortion on all pregnancies. Finally, data were not available on several potentially important determinants of abortion, including fertility desires, son preferences, duration of pregnancy intervals and women's autonomy.

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