Anonymous third party reporting of induced abortion: An experiment in Rajasthan, India

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Abstract

Background: Traditional approaches used to quantify abortion levels are characterized by methodological constraints, high levels of under-reporting and great variability in estimates for a given population, precluding valid estimates of this important determinant of fertility.

Objectives: We test a new method of abortion estimation in which women report on experiences among up to five unnamed members of their personal network, referred to as Anonymous Third Party Reporting (ATPR) and compare those estimates with their self-reported survey (SRS) data in a household survey of 3266 women in Rajasthan, India.

Methods: We compared estimates for unwanted pregnancy, abortion attempts, successful abortions, abortion complication rates and treatment-seeking behavior for complications across the two methods. Regression analysis was used to further investigate the effect of the method of data collection on reporting of abortion attempts and to assess the impact of abortion stigma on reporting.

Results: The ATPR method yielded significantly lower rates of unintended pregnancy, attempted abortion and successful abortion than the SRS method, similar rates of complications and higher rates of treatment seeking behaviors for complications. Regression analysis showed that the ATPR method is less likely to lead to report of abortion attempts than the SRS method, even after controlling for abortion stigma and demographic factors. The SRS method, however, is subject to more under-reporting when women perceive abortion to be illegal or have conservative attitudes towards abortion.

Conclusion: Given the potential for the ATPR method to minimize under-reporting of abortion experiences due to abortion stigma, further work is required on how best to elicit members of personal networks for whom women have accurate and intimate knowledge about their abortion experiences.

Introduction

Induced abortion is practiced throughout the world, regardless of legal restrictions in many regions. As few countries maintain accurate abortion statistics, however, little is understood about this method of fertility control. Without accurate estimates of abortion, large questions remain unanswered on the demographic, programmatic and policy fronts. Indeed, accurate abortion data can further demographic knowledge regarding fertility regulation and trends (Tietze and Bongaarts, 1976; Frejka, 1985; Singh and Sedgh, 1997). Similarly, abortion rates, when available for different segments of the population and for different time periods, can be used to monitor the progress of family planning programs (Brown and Eisenberg, 1995; Rahman et al, 2001). Counts of abortions, both illegal and legal, also can be used to advocate for policy change, particularly in areas where maternal morbidity and mortality are high (Berer, 2000).

As is the case with many sensitive issues, however, the measurement of abortion prevalence is fraught with methodological constraints, high levels of under-reporting and great variability in estimates for a given population. In the absence of accurate abortion statistics, estimates have typically come from three sources: facility-based methods that extrapolate from the number of directly observed abortion complications to the number of abortions occurring at the community level, self-reported survey methods which use a variety of techniques to facilitate women's reports of their abortion experiences, and indirect estimates which do not collect information on abortion *per se*, but use data on other determinants of fertility to assess the residual effect of abortion.

Each of these methods of estimation, however, has significant shortcomings: Facility-based methods make a number of unsubstantiated assumptions, self-reported survey methods require large sample sizes and under-estimate the prevalence of abortion even in countries where abortion is legal or not stigmatized, and indirect estimates are subject to potentially significant measurement error. Ultimately, each of these methods has been associated with substantial uncertainty and instability, warranting investigation of a new method of abortion estimation. In this paper, we test an experimental approach of measuring abortion prevalence in Rajasthan, India in which women reported on abortions occurring among up to five unnamed women in their personal support network, thus potentially increasing the survey sample size, as well as women's willingness to report abortions. As India lacks accurate abortion statistics to gauge the accuracy of estimates from this new method of measurement, referred to as anonymous third party reporting (ATPR), we compare the ATPR estimates with those calculated using self-reported survey (SRS) data.

Abortion in India

For over 30 years, following the enactment of the Medical Termination of Pregnancy (MTP) Act of 1971, women in India have been entitled to legal abortion services (Government of India, 1971). In addition to the medical indications permitted in many other countries, including physical danger to the mother's health, rape and fetal malformations, the MTP Act permits abortion in cases of potential injury to the mother's mental health and, among married women, contraceptive failure. Abortions must be performed within the first 20 weeks of pregnancy at a facility approved by the government and by a licensed medical practitioner, who has received

training in abortion provision from a government hospital or an approved training facility. (Government of India, 1971).

Despite the existence of a seemingly liberal abortion policy, important deficiencies in its implementation have contributed to the continued predominance of illegal abortions in India: Access to registered facilities is poor, particularly in rural areas (Khan et al, 1999). Quality of care of legal services is hindered by inadequately trained providers, pervasive infrastructure problems, poor treatment of clients and a lack of counseling (Gupta, 1993; Singh et al; 1997; Barge et al, 1998;Khan et al, 1999; Ramachandar and Pelto, 2002). Additionally, misperceptions regarding the legality of abortion are widespread among women, men and even providers (Sheriar, undated; Gupte et al, 1997; Ganatra, 2000a; Malhotra et al, 2003; Elul et al, 2004). Ultimately, 90% of the estimated 6 million abortions that occur in India each year are believed to be illegal and unsafe abortion is thought to account for 9% to 20% of all maternal deaths and extensive morbidity (Sood et al, 1993; Chhabra and Nuna, 1994; Ganatra, 2000a; Ganatra, 2000b; Johnston, 2002; Elul et al, 2004).

Standard approaches to measuring abortion levels [a]

Facility-based studies. Facility-based studies have been used widely to estimate regional or national abortion levels by extrapolating from the directly observed number of women treated for abortion complications in health facilities to the estimated total number of abortions in the population (Singh and Wulf, 1994; Singh and Sedgh, 1997; Singh et al, 1997; Henshaw et al,

[a] As this paper focuses on quantitative measurement techniques that can be applied easily at the population level, qualitative approaches are not reviewed here. Qualitative methods applied in discrete study sites, however, have yielded estimates of several magnitudes greater than those published for the same region and period using quantitative techniques (Bleek, 1987; Renne, 1997; Johnston, 1999; Rossier, 2002).

1998; Huntington et al, 1998). This technique entails four main steps: First, the number of hospital admittances for abortion complications must be obtained. Some researchers have gathered these data by reviewing existing hospital records (Singh and Wulf, 1994; Singh and Sedgh, 1997), while others have obtained them by establishing a temporary data collection system (Henshaw et al, 1998; Huntington et al, 1998; Rossier et al, 2003). Second, abortion cases are disaggregated into induced or spontaneous abortions using case-specific information (Figa-Talameca et al, 1986; WHO, 1987) or theoretical assumptions about the expected level of spontaneous abortions (Singh and Wulf, 1994; Singh et al, 1997). Third, the proportion of women with induced abortion complications that are hospitalized is estimated. This proportion depends on both the availability and quality of services, and, most often is estimated from a survey of health professionals, usually those dealing with complications of abortion (Makinwa-Adebusoye et al, 1997; Singh et al, 1997), although recently was estimated using a community-based survey of women (Lara et al, 2004). Fourth, the proportion of induced abortions that results in complications is calculated, and like the previous estimate, depends on the quality of abortion services. This figure has been estimated from surveys of health providers (Singh et al, 1997) and of women (Lara et al, 2004). The latter two figures are multiplied to generate an inflation factor or multiplier. As can be expected given the input data, if the quality of abortion services is relatively high, then the multiplier is larger, since a smaller proportion of women who have had abortions suffer from complications requiring medical attention.

Although facility-based studies have been used repeatedly to estimate abortion levels, the method relies on several assumptions, which, for the most part, have not been validated empirically. For example, the case-specific algorithms used to partition abortion cases into

induced or spontaneous categories assume that all abortions of unplanned pregnancies are induced, although numerous studies have called into question the validity of pregnancy intention measures (Pritchett, 1994; Bankole and Westoff, 1998; Williams et al, 2001 Joyce et al, 2002). Similarly, all uncomplicated abortions among women reporting planned pregnancies are assumed to be spontaneous, a potentially problematic assumption as access to safe and effective non-invasive abortifacients, such as mifepristone and misoprostol, increases. Additionally, as the multipliers which are used to extrapolate from the number of induced abortion cases identified in facilities have historically been based on data gathered from post-abortion care providers, they may over-estimate complication rates (Baretto et al, 1992; Makinwa-Adebusoye et al, 1997). Indeed, a recent representative household survey in Mexico City which gathered data on complications and hospitalizations from women who reported abortions yielded multipliers ranging from 7 to 25, suggesting that the widely cited hospital-derived multiplier of 5 at the national level is under-estimated by a factor of at least 1.4 and at most 5 for the country's capital (Lara et al, 2004).

Self-reported survey methodologies. Self-reported survey (SRS) methodologies rely on respondents sampled at the community level to report their own abortions and thus avoid many of the methodological shortcomings of facility-based estimates. In perhaps the simplest self-reported survey methodology, the face-to-face (FTF) interview, women are asked directly about their experience with abortion, usually as part of a pregnancy history. While potentially providing a more representative picture of abortion than facility-based studies, household surveys using direct FTF interviewing have proved largely inadequate for gathering data about abortion both where it is legal and where it is illegal, due to cultural and political taboos

associated with abortion: A comparison of FTF data from 1976 to 1982 with abortion registration statistics for that period in the United States found that survey respondents reported fewer than half of all registered abortions (Jones and Forrest, 1992). Even more extensive under-reporting was found when data on induced abortion from a 1993 Czech survey were compared with national statistics (Czech Statistical Office et al, 1995). Similarly, when researchers have used hospital records to purposively select respondents with a recent history of induced abortion or treatment for abortion complications and interviewed them at home several months after discharge using FTF interviewing, under-reporting and mis-classification have been pervasive: One study conducted in four developing countries found that only 4 to 52% of known abortions were reported (Figa-Talamaca et al, 1986). Even in Estonia, a country where abortion is legal and strongly supported by the government, only 70% of women identified in hospital records as having had recent abortions reported them subsequently in a FTF interview (Anderson et al, 1994). Moreover, most of these studies have documented significant differences in under-reporting rates by respondent characteristics: Despite a wide variety in study settings, individuals belonging to sub-populations in which abortion is particularly stigmatized (*i.e.* ethnicity, marital status, number of living children) were repeatedly far less likely to report recent abortions. Under-reporting in FTF interviews is so extensive, that questions on induced abortion have been omitted from the Demographic and Health Surveys in most countries.

Recognizing women's discomfort in disclosing abortions in FTF interviews, researchers have adopted two main approaches to minimize under-reporting of abortion data in household surveys relying on self-reported data: asking questions in an unobtrusive, culturally sensitive manner and replacing FTF interviewing with innovative survey techniques that protect the respondent's

privacy. The first strategy to minimize under-reporting entails asking questions about abortion in a value-free manner as possible, usually following a non-stigmatizing filter question. For example, women are asked about pregnancies that did not arrive at term and then about the exact nature of the loss (Anderson et al, 1994), or are queried about unwanted pregnancies and then probed about the outcomes of such pregnancies (Huntington et al, 1993; Huntington et al, 1996; Okonofua et al, 1999). While the latter line of questioning has yielded high abortion rates in some settings, in others, little, if any, increase in abortion reporting has been observed when the data were compared with levels obtained from direct FTF questioning about abortion (Huntington et al, 1996).

The second strategy to minimize under-reporting of abortion data in surveys entails using innovative survey techniques, which, in essence, allow respondents to report their abortion experiences privately, without the interviewer's knowledge. The most widely tested of these techniques are the ballot box or self-administered questionnaire (SAQ), the random response technique (RRT), and audio-computer-assisted self-interviewing (ACASI). In the SAQ, participants are handed a questionnaire by an interviewer that they complete privately, seal in an envelope and place in an urn, which is not opened until all interviews are complete, ensuring high response rates and respondent anonymity (Olinto and Victora, undated; Jones and Forrest, 1992; Zamudio et al, 1999; Lara et al, 2004). While abortion rates obtained using SAQ have been higher than those estimated from FTF interviewing (Jones and Forrest, 1992; Lara et al, 2004), this approach is restricted to literate respondents, vastly limiting its potential in developing countries. Moreover, while respondents may "complete" the questionnaire, they may skip questions of critical interest to researchers leading to high item non-response rates (Lara et

al, 2004). The RRT, which has been used to collect information on sensitive topics for many years, entails having the respondent randomly select one of two binary questions, usually at the end of a FTF interview: Either "Have you ever had an induced abortion?" or a more neutral question with a known distribution of responses such as "Were you born in April?" The interviewer records the response without knowing which question was asked. The prevalence of induced abortion can be estimated by subtracting the expected proportion of "yes" responses to the "dummy" question from the overall prevalence of "yes" responses. While the RRT has yielded high abortion rates (Abernathy et al, 1970) and higher rates than obtained with FTF questioning and the SAQ technique (Chow et al, 1979; Tezcan and Omran, 1981; Lara et al, 2004), gathering contextual data about a respondent's abortion is impossible: The method allows for only one "dummy" question and produces aggregate abortion estimates which cannot be linked to the individual-level data collected during the FTF interview. Additionally, the technique requires a larger sample size than other methods for the same power, since only a subset of the respondents are asked about abortion. ACASI technology, as its name suggests, replaces the interviewer with a computer, in an attempt to decrease under-reporting in surveys. This method has been used recently to gather information about abortion in the United States (Fu et al, 1998; Mosher, 1998; Jagannathan, 2001) and Mexico (Lara et al, 2004), and redresses some of the limitations of the SAQ and RRT as it can be used by illiterate respondents and provides individual-level abortion information. While ACASI yielded higher abortion rates than FTF interviewing at the national level in the United States (Mosher, 1998), a subsequent ACASI survey of New Jersey welfare clients whose abortions were documented in Medicaid files found an under-reporting rate of 61%. Despite efforts to ensure respondents' privacy, disclosure of recent abortions was significantly associated with abortion and childbearing attitudes: Women

with more restrictive attitudes towards abortion and more positive attitudes towards childbearing were more likely to under-report abortions (Jagannathan, 2001). Additionally, when tested against three other survey methods in rural and urban Mexico, the benefits of ACASI over others was less clear, particularly among rural women who were ill-at-ease with the computer system (Lara et al, 2004).

Indirect estimation. Several indirect estimation techniques that avoid many of the logistical and methodological shortcomings of facility-based studies and self-reported survey data have been developed to measure abortion levels. Foreit and Nortman (1992), and later Johnston and Hill (1996), adapted Bongaarts' model of the proximate determinants of fertility (Bongaarts, 1978; Bongaarts, 1982) to calculate abortion as a residual effect. The Bongaarts' model quantifies the effect of several key proximate determinants in reducing fertility from its theoretical maximum to the total fertility rate (TFR) using the following equation[b]:

$$TFR = TF * C_m * C_c * C_a * C_i$$

The theoretical level of maximum fertility (*i.e.* total fertility or TF), which is usually assumed to be 15, is multiplied by indices representing the births averted by delayed exposure to sexual intercourse (C_m), contraception (C_c), induced abortion (C_a) and postpartum insusceptibility (C_i). Each index ranges from 0 to 1 (with lower values representing increased fertility-reducing effects) and, aside from the index of abortion, can be calculated using survey data.

[b] While the full model includes seven proximate determinants, Bongaarts (1982) demonstrated that four factors (*i.e.* exposure to intercourse, contraception, induced abortion and postpartum insusceptibility) account for 96% of the variance in TFRs using data from 41 populations.

Johnston and Hill (1996) rearranged Bongaarts' equation to estimate the index of abortion as follows:

$$Ca = TFR / (TF * C_c * C_a * C_i)$$

Once C_a is calculated, it can be converted to the total abortion rate (TA) or the sum of period age-specific abortion rates (Bongaarts and Potter, 1983). An annual abortion rate is then derived by dividing TA by 30 or 35, the number of reproductive years between 15 and 44, and 15 and 49, respectively. The residual abortion index, however, is subject to potentially significant measurement error. Minute variations in the other proximate determinants can result in large changes in the estimated abortion rate, and thus, the accuracy of the abortion estimate depends on the quality of the input data (Johnston, 1999; Rossier 2002). Additionally, the calculation assumes a theoretical level of maximum fertility of 15, which if not accurate for the study population, may severely under- or over-estimate the abortion rate; even a change of one birth in the assumed maximum fertility would lead to a significant change in the abortion rate. Not surprisingly given the potential for important biases in this method, studies validating abortion rates calculated using indirect estimation have had mixed results: In Bangladesh, where marital status is an appropriate proxy for exposure to intercourse, the abortion rate obtained using the Bongaarts' formula was of the same magnitude as that obtained using facility-based estimates (Johnston, 1999). In contrast, in a study conducted in Burkina Faso in which adolescents were believed to have under-reported sexual activity, the indirect estimate was far lower than those obtained using several direct estimation methods (Rossier, 2002).

A new way to measure abortion: Anonymous third party reporting (ATPR)

Given the limitations of existing methods to measure abortion, we tested a new approach in which women were asked to report on abortions among five unnamed confidantes as an alternative for estimating abortion levels. Coined recently by Rossier (2003) as anonymous third party reporting (ATPR), this method builds on the principle of network or multiplicity sampling. Multiplicity sampling, as it is often referred to in the statistical literature, is an analytical approach that gathers information about members of a respondent's personal network, rather than the respondent's personal experience: Respondents are asked about the occurrence of (rare) characteristics within the set of people defined by a specific multiplicity rule (generally consanguine or spatial relationships). If information on the size of the respondent's network is available, it can be used to weight the number of people they report as having the characteristic of interest and an unbiased estimate of the number of persons with the characteristic in the population can be calculated, as can its variance.

As it may dramatically increase the effective size of a sample, multiplicity sampling has been used for some time to gather information about rare events (Sirkin, 1970, 1972; Kalton and Anderson, 1986; Sudman et al, 1988) – including maternal mortality (Boerma and Mati, 1989; Graham et al, 1989)[c] and, even more specifically, abortion-related mortality (Koster-Oyekan, 1998) – which occur too infrequently to be measured in standard individual or household surveys. Assuming respondents are more forthcoming in reporting on members of their personal network than they would be in reporting on themselves, multiplicity sampling also has the potential to increase prevalence estimates when applied to sensitive topics or those dealing with illicit behaviors: To this end, it has been used to count AIDS cases and homicide victims (Laumann et al, 1989; Laumann et al, 1993).

[c] Demographers refer to this as the "sisterhood method" of measuring maternal mortality.

The literature on abortion is replete with studies demonstrating that personal networks are an important source of abortion information, and more importantly, that information about abortion diffuses in a community over a relatively short period of time, providing a contextual basis for testing a multiplicity approach to measure abortion levels. The most detailed example of the diffusion process comes from Lee (1969), who documented the processes and pathways, which 114 women underwent to terminate unwanted pregnancies in the United States before the legalization of abortion. In her study, women first consulted an average of 4.1 individuals, largely partners, female friends and family members, during the decision-making process – starting when they suspected they were pregnant and ending when they had confirmed and decided to end the pregnancy. Once resolved to end their pregnancies, women spoke to an average of 2.8 people, who in turn contacted an average of 1.8 individuals, in their efforts to identify a provider willing to provide an abortion. Finally, women continued to share their abortion experiences with others in their personal networks, mainly female friends, following their procedures, and in many cases, told more individuals about their abortions after they occurred than they when they were occurring.

Similar processes of diffusion of abortion information among personal networks have been documented in developing countries. A recent qualitative study of women seeking abortions in India, for example, found that 1.7 people were consulted during the decision-making process, while another reported that extended family members, especially mother-in-laws and sister-in-laws, were intimately involved in the decision-making process among married women (Barge, 2001; Visaria et al, 2003). Another Indian qualitative study, which explored abortion networks,

found that women learned of traditional abortifacients, as well as abortion providers from other women in their communities (Bracken et al, 2004). Similarly, in a study of urban adolescents seeking post-abortion care in Tanzania, girlfriends were found to facilitate the link to a provider in nearly 30% of cases, and close female relatives in an additional 20% of cases (Mpangile et al, 1999). Qualitative research conducted in rural Burkina Faso demonstrated that when abortion is rendered a clandestine event (either by law or due to cultural factors), women are forced to inform others about their desire to terminate a pregnancy as they search for a suitable provider (Rossier, 2002). Information about abortion also has been found to spread in a community when complications occur (Rossier, 2002). Given the multitude of opportunities for abortion information to be shared and diffused at the community level, it is not surprising that a study of secondary school students in Nigeria found that while none reported having undergone abortions themselves, 79% knew of others who had (Renne, 1997).

To date, two studies have used third party reports to quantify abortion at the population level. In the first, women in rural Burkina Faso reported on all abortions that they had heard of in a specified time period and place (Rossier, 2002). The abortion rate was then calculated using the population of the study community as the denominator (rather than units of risk exposure). When compared against three other estimates for the same community, ATPR yielded the highest abortion rate. While this study confirms that women are informed about and willing to report on abortions other than their own, as no information was collected on the size of women's networks, point estimates could not be calculated using a matched numerator and denominator. Further, without information on network size, the researcher was unable to take advantage of the proportional reporting (*i.e.* multiple reports appearing in both the numerator and the

denominator) implicit in multiplicity sampling and was thus required to develop algorithms to remove duplicate data.

In the second study, Rossier and colleagues (2003) used a more direct multiplicity approach to estimate abortion levels in a representative survey of 963 women in Ouagadougou, the capital of Burkina Faso. Women were asked to first list their close confidantes and then were asked a series of questions about each confidante in turn, including whether she had an induced abortion in each of the five years preceding the survey. The number of annual abortions estimated from the third party reports was compared against that extrapolated from the number of abortion complications presenting at the city's five referral facilities over a four-month period. A strong congruence between the number of abortions obtained from the ATPR approach and those estimated from the facility study bolsters the case that third party reports of personal network members' experiences can produce reliable estimates of abortion.

In this paper, we build on those studies and aim to further refine the ATPR method. Specifically, we explore the benefits and limitations of ATPR data when compared to SRS data. As most countries of the world, including India where this study occurred, lack accurate abortion statistics and thus a gold-standard for validating new estimates, a comparison of abortion estimation methodologies can yield information on the relative accuracy of each approach. Given evidence that innovative survey techniques which increase respondent privacy minimize under-reporting of abortion (Chow et al, 1979; Jones and Forrest, 1992; Lara et al, 2004; Mosher, 1998; Tezcan and Omran, 1981), we hypothesized that a method that completely removes self-reports would yield higher estimates.

Data collection

Abortion estimation methodologies

Both abortion estimation methods tested in this study were imbedded in a single face-to-face survey instrument on unwanted pregnancy and abortion, which took an average of 55 minutes to administer. Table 1 provides the exact wording and closed-ended response options used to gather the data on unwanted pregnancy and abortion required for each estimation method. The ATPR method consisted of 17 questions posed to the survey respondents at the end of the interview. Respondents were first asked to list, but not name, five ever-married women aged 15-44 in their personal support network using the following introduction: "It is very common for people to discuss important matters and share secrets with friends or family members that they are close to. I want to know a few things about the people you share the most with. I do not need to know their names, only their initials. Please tell me the initials of up to five women aged 15-44 who are either currently married or have been married before and with whom you discuss important matters."[d,e] By delineating their personal support networks, the respondents generated our second sample or the ATPR sample. After listing the members of their personal network, women were asked a series of questions about each confidante in their network in turn as follows:

a) *Relationship:* The first four questions documented the nature of the respondent's relationship with each confidante, including the closeness of their relationship, their exact

[d] Various approaches to generating personal network members exist (name?,1993). The one used in this study most closely resembles the "exchange" approach in which respondents identify individuals with whom they *interact* on socio-emotional matters. Compared to other approaches for delineating personal netowrks, the "exchange" approach yields the most clearly and objectively defined personal support network.

[e] The decision to use a network generator of five balanced the desire to increase the effective sample size dramatically (by up to a factor of five) and the wish to develop a method that could be administered relatively quickly. Additionally, previous research conducted on the most efficient and effective way of delineating personal support networks found that a generator of five explained most of the variance in the total support network size (van der Poel, 1993).

relationship (*i.e.* sister, friend, neighbor, etc.), the duration of their relationship and the frequency of their contact.

b) *Demographics:* The next seven questions gathered basic demographic information for each confidante, including her age, caste, religion, and number of living children, if she was literate, if she ever attended school, and if so, the number of completed years of schooling.

c) *Unwanted pregnancy and abortion:* The remaining five questions were used to collect basic information about the confidante's experiences with unwanted pregnancy and abortion in the five years preceding the survey including the occurrence of unwanted pregnancy, attempts to stop those pregnancies, outcomes of attempted abortions, complications of attempted abortions and treatment-seeking behavior for complications.

If respondents did not know the requested information about a given confidante, this was documented as well. Ultimately, these 17 questions generated the data required for both the numerator and the denominator of the ATPR abortion estimates.

The SRS method was incorporated in the reproductive history section of the study instrument. We used questions on pregnancy intendedness as a segue way to ask about abortion, both for pregnancies that resulted in a live birth, as well as those that did not (Huntington et al, 1993; Anderson et al, Huntington et al, 1996; 1994; Okonofua et al, 1999). Live births were documented via a detailed birth history. For each reported birth, respondents were queried about the wantedness of that child. If a woman reported that a child had been unwanted at the time of the pregnancy, she was further asked about attempts to terminate that pregnancy. Additionally, after obtaining the detailed birth history, the interviewer constructed birth intervals and asked

about pregnancies that did not result in a live birth in each interval. For example, starting with the interval closest to the survey, the interviewer asked, "Did you have any pregnancies that lasted only a short time between now and the birth of [name], your last child?" For each such pregnancy reported, women were asked if the pregnancy had been wanted and the outcome of the pregnancy. Women were asked the same set of questions for each birth interval. Women who reported at least one successful abortion in the five years preceding the survey were asked in detail about their (last) abortion experience, including whether they experienced any complications and sought treatment for those complications.

Sampling

We used multi-stage stratified cluster sampling to select a sample of 3266 ever-married women between 15 and 44 years of age across six districts of Rajasthan. As the survey data were to be used as a baseline for a large evaluation of an abortion-related intervention, the six districts were purposively sampled and an *a priori* decision was made to restrict the sample to district headquarters and villages and towns lying within a 25 kilometer radius of the district headquarters, as well as one pre-selected town per district and villages lying within a 5 kilometer radius of those towns. We began by stratifying our sample by residential area, over-sampling urban areas to improve the reliability of estimates for those heterogeneous localities. In the next stage of sampling, depending on the type of administrative unit being sampled (district headquarter or town *vs.* village), wards and then quadrants (district headquarter or town), or quadrants only (village) were randomly selected from a complete list of primary sampling units (PSUs). As census maps were unavailable, a listing of 200 consecutive households, beginning at a randomly selected spot, was completed in each randomly selected PSU and served as the

sampling frame. In district headquarters and towns, 30 households were then randomly selected from the frame, while in villages, 20 households were randomly selected. For every selected household, which agreed to participate in the survey, we listed all members and collected information on the socio-economic characteristics of the household. Finally, all ever-married women residing in a selected household were invited to participate. Ultimately, 3266 of the 3682 eligible women identified participated in the study, yielding a response rate of 88.7%. As the study districts were purposively sampled, the data cannot be weighted to project the results to the entire state of Rajasthan, and thus generalizations are limited to the sampled areas.

Statistical analysis

Two kinds of analyses are undertaken:

1) *Development of the ATPR method and estimates.* We begin by describing the socio-demographic profile of our respondents' personal networks and compare them with that of our survey sample using chi-square tests and t-tests. We then summarize the information our respondents knew about their network members using the total network sample as our denominator and test for residential differences (rural *vs.* urban) using chi-square tests. This analysis provides denominator data for subsequent point estimates as it indicates the number of confidantes for whom respondents supplied responses that were either positive ("yes") or negative ("no"), as opposed to non-indicative ("do not know" or "refused to respond").

We then calculate frequencies of unwanted pregnancies, abortion attempts, successful abortions, abortion complications and treatment seeking behavior for complications among respondents' personal networks. While reporting of successful abortions is our main outcome of interest, we

examine reporting in the antecedent and consequent events to better understand potential limitations of the ATPR method. As suggested above, denominators for these estimates come from the meaningful responses ("yes" or "no") our respondents provided when queried about their network members. Numerators are calculated as the number of confidantes in the denominator reported to have experienced the event in question (*i.e.* unwanted pregnancy, attempted abortion, etc.). To test the reliability of the ATPR data, we compare unwanted pregnancy and abortion estimates obtained using that method with those obtained using the SRS method, and test for differences across the two methods using chi-square tests both for the total sample and for the rural and urban subsets. As over-reporting of unwanted pregnancies and abortions is unlikely, we assume that the method that yields the highest estimates is the most accurate. We also stratify the ATPR estimates by network factors (*i.e.* exact relationship, duration of relationship, frequency of contact, intimacy of relationship) and use chi-square tests to explore whether reporting is increased for certain sub-sets of respondents' networks.

2) *Determinants of abortion attempts.* In the second part of the analysis, we construct bivariate and multivariate logistic regression models to examine the effect of the method of data collection on reporting of abortion attempts.[f] Models are estimated for the total sample and, since we find significant effects of the method of data collection on reporting of abortion attempts at both the bivariate and multivariate levels, separately for the SRS and ATPR methods as well.

In all cases, we pay particular attention to the impact of abortion stigma on reporting.

[f] Due to the small number of successful abortions (n=82) reported among respondents' network members, we are unable to model determinants of reporting successful abortions.

The stigma associated with abortion has been found to decrease reporting of abortions in the United States (Smith et al, 1999; Jagannathan, 2001) and is believed to impact reporting in other countries (Baretto et al, 1992; Rossier, 2003). We used two variables as proxies for this construct, one tapping respondents' awareness of abortion legality in India, and the other describing their attitudes about abortion. If the ATPR method avoids under-reporting due to the stigma of abortion, we expect to see a significant relationship between the abortion knowledge and attitude factors and reporting in the SRS models, but not in the ATPR models. More specifically, in the SRS models, we hypothesize that respondents who believe that abortion is illegal in India and/or have more conservative attitudes towards abortion will be less likely to report their own abortion attempts in the SRS models, but that their abortion legality knowledge and attitudes will not impact reporting of their network members' abortion attempts in the ATPR models. Awareness of the legality of abortion is determined using responses to two questions, one asking if abortion was legal in India and another asking if there is a law on abortion in India. Respondents who answered in the affirmative for either are considered to be knowledgeable of the legality of abortion in India. With this measure, 16% of respondents (urban: 19%; rural: 13%) are coded as being aware of the legal status of abortion. A summary measure is similarly developed to capture abortion opinions: Respondents were asked under which of eight situations they thought a woman should be able to have an abortion. Of these eight, four are conditions under which abortion is permissible by law in India, including contraceptive failure, rape, endangerment of maternal health, and possibility of fetal malformation. The remaining four conditions included not wanting another child, not being able to afford the child, having a gestational age greater than 20 weeks, and being unmarried. Respondents are considered to have liberal views if they support abortion in five or more of these situations, including all four

pertaining to the law. Individuals with conservative attitudes are defined as those who support abortion in three or fewer conditions, and only two or fewer of these pertain to the law. Respondents who are neither conservative nor liberal are classified as moderate. Using this index, 8% of respondents (urban: 6%; rural: 13%) are conservative, 37% moderate (urban: 35%; rural: 40%) and 55% liberal (urban: 59%; rural: 47%).

We also include a set of control variables, which include typical demographic measures such as age, parity, and literacy.[g] In the SRS cases, we use the demographic data our respondents provided about themselves, while in the ATPR cases, we use the demographic data our respondents supplied for their network members.

In the case of the ATPR models, we consider the same two sets of variables – abortion stigma and demographic control – but also examine the effect of a third set of variables – network variables – on reporting of abortion attempts. The network variables describe the nature of respondents' relationship with each member of their personal network and include the exact type of relationship (*i.e.* sister, friend, neighbor, etc.), the duration of their relationship, and the frequency of their contact. All of these data were reported directly by the survey respondents. We also create a variable to capture the intimacy of their relationship, which reflected whether the confidante had been the first network member named by a respondent or had been named later in the network. We have no expectations of the direction or significance of the effects of these variables on reporting of abortion attempts among network members, but rather include them to explore if certain relationships are associated with increased reporting.

[g] Caste is not considered in these analyses due to problems encountered in coding this variable for the ATPR data (see footnote h below).

At the multivariate level, we construct the models incrementally. In the pooled analysis, we start first with the method variable and then add the abortion stigma variables, and finally, the demographic controls. In the stratified models, we start with abortion stigma variables add the controls and then, in the case of the ATPR model, the network factors. All analyses account for clustering at the household (SRS and ATPR) and respondent levels (ATPR), and were performed using STATA 7.0.

Results

Development of the ATPR method and estimates

Personal networks

The majority of the 3266 respondents in our sample, whether residing in an urban (75.3%) or rural area (76.4%) provided the name of at least one ever-married woman aged 15-44 years with whom they share important matters. On average, however, both urban and rural women's personal networks were small, consisting of 1.3 women and generating a total of 4306 confidantes (urban: 2597; rural: 1709). Indeed, only 1.4% of respondents provided five network members, the total number we asked about. Based on the demographic information provided by our 3266 respondents about their 4306 confidantes, we find small, but statistically significant, differences in socio-demographic characteristics between the two groups (Table 2). Network members were slightly younger and more educated, and had fewer living children than the survey respondents. Despite these differences, both groups were overwhelmingly Hindu, illiterate and parous.

As indicated in Table 3, for the most part, our respondents' personal networks were comprised of friends (57.5%), sister-in-laws (17.4%) and biological sisters (14.9%), entailed either daily contact (43.5%) or, conversely, contact every several months (31.7%), and had been established over six years prior to the survey (83.7%). Rural respondents were significantly more likely than their urban counterparts to include family members and/or neighbors, as opposed to friends, in their personal networks, and to cite networks members that they interacted with on a daily basis and had known for a shorter period of time. Only a few network members (1.7%) were considered to be "very close friends" by the survey respondents and, not surprisingly given the small mean network size, over half (57.4%) appeared first in respondents' lists of network members.

When asked in detail about the women in their personal networks, our urban and rural survey respondents appeared to have intimate knowledge (Table 4). They were able to supply demographic details about them in almost all cases, and were nearly universally able to provide answers to questions on more sensitive topics.[h] Indeed, for only 2.8% of the 4306 confidantes identified were respondents unable to answer a question about their confidantes' experiences with unwanted pregnancy in the five years preceding the survey. Similarly high response rates were observed when respondents' were asked about abortion experiences among their network partners were observed. Surprisingly, only when queried about complications following abortions among their confidantes did we observe a decrease in reporting (83.3% - 95.8% of cases), particularly among our rural sample.

[h] As indicated in Table 4, respondents supplied caste information for 100% of their confidantes. An error in the wording of the question on caste, however, precluded us from coding those data into meaningful categories for 6% of confidantes.

Experiences with unwanted pregnancy and abortion

With both the SRS and the ATPR methods, we obtained overall unwanted pregnancy rates between 9.8% to 12.0% (Table 5). While the SRS method yielded statistically significantly higher unwanted pregnancy rates than the ATPR method for all women (SRS: 12.0%; ATPR: 9.8%) and for urban women (SRS: 13.5%; ATPR: 9.9%), there was no difference in unwanted pregnancy rates for the rural sample (SRS: 9.7%; ATPR: 9.8%).

When we probed further about attempts to terminate those pregnancies among our survey sample and members of their networks, divergent pictures emerged based on the method of data collection. Using the SRS method, we find that 52.6% of the 392 women with unwanted pregnancies in the five years preceding the survey attempted to terminate them, while the comparable ATPR figure is substantially and statistically significantly lower: According to those data, 34.7% of the 412 confidantes reported to have had unwanted pregnancies in the past five years attempted to terminate them. The SRS method yields higher rates of attempted abortion even when the data were disaggregated by geographic residence. Additionally, while both methods suggest significantly higher proportions of urban women attempted to terminate unwanted pregnancies than rural women, the differential is substantially larger in the SRS data (urban: 58.7% of 266 women; rural: 39.7% of 126 women) than in the ATPR data (urban: 38.3% of 249 confidantes; rural 29.5% of 163 confidantes).

With regard to successful abortions, again, the two methods of data collection depict very different scenarios. The SRS data suggest a very high rate of successful abortion among those attempting pregnancy termination (98.5%), and that is nearly twice the rate observed when the

ATPR method is used (58.6%). Surprisingly, given poor access to abortion services in rural India, the SRS data suggest that both the 197 urban and the 64 rural women we sampled who attempted to terminate an unwanted pregnancy had an equal likelihood of succeeding (98.5% - 98.7%). Based on the ATPR data, the proportion of the 140 confidantes who attempted abortion and were successful varied substantially by area of residence: Only 45% of the 48 rural confidantes who attempted abortion were successful, compared to 66% of their 93 urban counterparts.

As for complications rates, both methods indicate high rates (>25%) among women with successful terminations. No statistically significant differences were observed in complication rates across the two methods, even when the data are disaggregated by residential area. Women who reported that they, or their confidantes, had experienced complications following a recent abortion were asked whether they had sought treatment for those complications. While both methods of measurement indicate significant portions of women seeking treatment for complications (>45%), the ATPR method produced a rate of 88.2% (of 17 confidantes), nearly twice that observed with the SRS method (45.3%). Despite small cell sizes, this difference is significant and persists in the urban sub-group as well.

When the ATPR estimates were stratified by various network factors (Table 6), no factor was associated with higher reporting rates across all the estimates taken together. Moreover, network factors seemed to have little effect on improving reporting for any one estimate, with the exception of the frequency of contact between respondents and their network members: Having weekly, bi-monthly or monthly contact with a network member, as opposed to contact on a daily

or infrequent basis was associated with reporting higher rates of abortion attempts (daily contact: 35.5%; weekly, bi-monthly or monthly contact: 45.7%; every several months contact: 24.3%). Analyses not shown suggest that this findings may result from the fact that network members which our respondents saw on a weekly, bi-monthly or monthly basis were largely friends as opposed to family members. When we further stratified the ATPR estimates for unwanted pregnancy and abortion attempts by both residence (*i.e.* urban vs. rural) and network factors, we again found little variation in the ATPR estimates (data not shown).[i]

Determinants of abortion reporting

Bivariate results

Table 7 displays the results of the bivariate logistic regression analyses predicting the likelihood of reporting an abortion attempt for the pooled data and for the SRS and ATPR methods of data collection separately. In the bivariate models for the pooled data (column 1), we see that the method of data collection significantly impacts the likelihood of reporting an abortion attempt. Indeed, relative to the SRS method, the ATPR method is 58% as likely to yield a report of attempted abortion. This relationship persists even as each of the abortion stigma and demographic control variables is added in turn to the bivariate model.[j]

The bivariate SRS and ATPR models (which do not control for method of data collection) yield further insights on the relative advantage of the two method of data collection. As hypothesized, the two variables measuring possible abortion stigma significantly impact reporting of abortion

[i] Due to small sample sizes for the ATPR estimates of successful abortions, complications of abortion and treatment seeking behaviors for complications, the stratified two-by-two analysis was restricted to reports of unwanted pregnancy and abortion attempts.

[j] In the case of the pooled analysis, the bivariate models control for the method of data collection.

attempts among respondents but not among their network members (columns 2 and 3): Indeed, while respondents who believe that abortion is legal in India are two times as likely to report attempting to terminate an unwanted pregnancy when compared to those who believe abortion is illegal, correctly perceiving that abortion is legal in India is not associated with increased reporting of abortion attempts among network members. Similarly, having liberal opinions about abortion is statistically significantly associated with increased odds of reporting one's own abortion attempt but is not significantly associated with reporting attempts at abortion among one's personal network. The direction of the effect of the demographic control variables on abortion attempts is, for the most part, constant across methods: In both the SRS and the ATPR models, living in an urban area, having more living children and being literate are all associated with increased odds of reporting an abortion attempt, while age exhibits an inverted-U shaped relationship with attempted abortion. For every demographic variable, however, the relationship with attempted abortion is attenuated in the ATPR models and in most cases, so much so that the association is no longer statistically significant. For example, while age exhibits an inverted-U shaped relationship with abortion attempts in both models, the odds of an abortion attempt are higher for every age group (compared to the reference category) when respondents report on their own abortion behavior than when they report on that of members of their personal network and the relationship is only marginally significant when they report on their network members' experiences. As for the effect of the network factors on reporting of abortion attempts in the ATPR models, only the frequency of contact between the respondent and her network member is significant: Respondents who have contact with their network members every several months are 50% less likely to report that their network members had attempted abortion.

Multivariate results

In Table 8, we examine the effects of these factors taken together on reporting of abortion attempts for the pooled data and for each survey methodology separately. In each case, Model 1 contains only the demographic variables, and the abortion stigma variables are added in Model 2.[k] In the ATPR models, the network factors are added in Model 3.

The pooled analysis confirms that even after controlling for abortion stigma and demographic factors, the ATPR method only produces a fraction of the reports of attempted abortion when compared to the SRS method (Model 2). When controlling for the method of data collection and demographic factors, however, the effect of the abortion stigma variables on reports of abortion attempts is muted. Indeed, while correctly believing that abortion is legal in India and having liberal attitudes towards abortion are both associated with increased reported of abortion attempts, these relationships are only marginally significant in the pooled analysis.

When the SRS data are isolated, however, the stigma variables regain their strong effect on reporting of abortion attempts (Model 3). Further, when we control for demographic characteristics, the abortion stigma variables remain significantly associated with reporting (Model 4). Indeed, all else being equal, respondents who are aware of the legality of abortion in India are 1.8 times as likely to report an abortion attempt than those who believed that abortion was illegal. Similarly, the more liberal the respondent's attitudes towards abortion, the more likely she is to report attempting abortion, even after controlling for demographic factors. All of the demographic factors that were significant at the bivariate level retained significance at the multivariate level, except for the respondent's religion. Of the control variables, the number of

[k] For the pooled data, Model 1 also contains a dummy variable for the method of data collection.

living children has the strongest effect on the odds of reporting an abortion attempt: Women with 2-3 living children and those with 5-10 living children were 1.7 and 4.2 times as likely to report an abortion attempt, respectively, when compared to those with 0-1 living children.

In the case of the ATPR data, as we saw at the bivariate level and in contrast to the SRS data, respondents' knowledge and attitudes regarding abortion legislation has no statistically significant effect on reporting of abortion attempts among their network members (Model 5). Network members' demographic characteristics have small and non-significant effects on reporting of their abortion attempts by our survey respondents, with the exception of the number of living children: The more living children network members has, the more likely they are purported to have attempted abortion (Model 6). Network factors also have little effect on respondents' reporting of abortion attempts among network members (Model 7).

Discussion

We tested a new approach of collecting data on abortion at the community level in Rajasthan, India by asking women to report on abortions among up to five unnamed members of their personal network and compared estimates from that method with those from SRS data. By asking women to report on abortion experiences occurring among their confidantes, we allowed some of the networking processes by which women decide to terminate a pregnancy, identify and select a provider, as well as seek care when complications arise, to generate our estimates.

The network or ATPR approach offers two potential advantages over SRS methods: an increase in the effective study sample size and a decrease in under-reporting of abortion experiences by

minimizing the stigma associated with abortion. We found mixed results. While the ATPR method has the potential to dramatically increase the effective study sample size, we did not observe this benefit: 25% of the women interviewed were unable to provide the name of even a single confidante, and those who did delineate personal networks had extremely small networks, inflating our sample by only 30% in rural and urban areas alike. Generally, however, women with personal networks appeared to have intimate knowledge of their network members. When asked to provide information on a range of demographic factors as well as more intimate details on unwanted pregnancies and abortions, the vast majority of women were able to provide a response for each of their network members. Despite this, our ATPR estimates of unwanted pregnancy, attempted and successful abortion were lower than the SRS estimates, particularly so for the latter two indicators. Indeed, our multivariate analyses demonstrated that the ATPR method is 58% as likely to yield a report of attempted abortion, even after controlling for abortion stigma and demographic factors. While these results suggest that women in Rajasthan may not be accurately informed about abortions occurring in their personal networks, when we further explored the determinants of reporting abortion attempts in models stratified by method of data collection, we found encouraging results: Respondents' knowledge and attitudes regarding abortion legislation impacted reporting of their own attempts at abortions, but did not affect reporting of abortion attempts among their network members. A method which minimizes women's reluctance to report abortions due to the legal and cultural stigma associated with it may offer an important advantage over other methods of data collection. Additionally, as we did not observe any increase in reporting of network members' experiences with unwanted pregnancy and abortion for any particular subset of network members, the ATPR method appears to be robust across many types of relationships.

Estimates of the proportion of women who sought treatment for complications following abortion were high for both methods of data collection, and particularly so among the ATPR sample: Fully 88.2% of network members with complications were reported to have obtained treatment for them. While this may imply that women in India may still be adopting higher risk traditional abortion techniques that are often unsuccessful and frequently produce complications requiring treatment or may have resulted from instability in our estimates due to small cell sizes, we cannot rule out the possibility that our respondents were more likely to learn of abortions among their network members when they resulted in complications that required treatment by a provider. If this is indeed the case, it points to a potentially important bias in the ATPR estimates.

Thus, the issue of whether an approach based on women's reports of sensitive behaviors among members of their personal networks is any less constrained in terms of response validity than those relying on self-reports remains unclear. Recent more successful experiences with third party reporting of abortions in Burkina Faso suggest that this method may be best suited for settings or sub-populations where abortion is highly clandestine and thus women are forced to rely on others to identify providers (Rossier, 2002; Rossier et al, 2003). While illegal abortion prevails in India, providers (whether legal or illegal) are likely more accessible there than in a country such as Burkina Faso, where abortion remains illegal and extremely inaccessible. Regardless of the context, ATPR may be particularly well-suited for adolescents or unmarried women, sub-groups characterized by less familiarity and access to the health-care system, more covert pregnancy terminations and perhaps more intimate friendships with female peers than

among older or married women. As our sample was restricted to every-married women, however, we were unable to examine differences in ATPR reporting by marital status.

Based on our experience, we suggest several improvements and avenues for future research with regards to ATPR reporting of abortion, and potentially other sensitive behaviors. First, further work is required on how best to elicit members of personal networks for whom women have accurate and intimate knowledge. While cultural constraints on women's mobility in Rajasthan certainly may explain the small mean network size in our study, additional efforts are needed to better understand the composition of women's personal networks in developing countries and how those women refer to members of their personal networks. We asked about individuals whom our respondents confided in and assumed a reciprocal relationship, which may not be appropriate given that some confidantes crossed generational and family lines. In future studies, one option would be to ask directly about people who confide in the respondent directly rather than those in whom she confides. The name generator could be further refined to elicit individuals who confide in respondents regarding health issues, but care should be taken not to lead respondents to over-select individuals who have had abortions, as this would lead to a biased network sample. Additionally, a question should be added to confirm the residence of the confidantes. In our analysis, we assumed that they lived in the same area (*i.e.* rural vs. urban) as our respondent, but this should be confirmed empirically in future studies. Further, future analyses of ATPR data should be weighted by network size. Using weights would account for any difference in network size across sub-groups of the population, as well as the likelihood that women with larger personal networks are more likely to be included in a respondent's network,

both potentially troubling if the probability of having an abortion depends on the size of a woman's network.

An additional aspect of the ATPR method that needs further reflection is the effect of multiple reporting of the same woman in two or more respondents' personal networks on the estimates. Using a geographically dispersed sample and selecting a sole respondent per household, as is common in large-scale population-based surveys, minimizes the likelihood of the same women being included in two different respondents' personal network. Should multiple reporting occur nonetheless, a bias would be introduced only if the respondents provided discordant reports of their network member's abortion history or if none reported that she had an induced abortion. In such cases, the network member would be over-represented in the denominator of the ATPR estimates and the estimates would have to be considered lower bounds. In cases where all respondents report the duplicate network member as having had an abortion, her repeat counting in the denominator would be matched proportionally by repeat counting in the numerator and thus the estimate would be unbiased. The probability of multiple reports could be explored empirically in new study areas through small-scale network density studies (which do not ask about abortions, but rather simply explore overlap in networks among respondents) before the administration of the ATPR questions at the population level.

Finally, we note several limitations of our study. First, the questions used to measure unwanted pregnancy and abortion in the SRS and ATPR methods differed somewhat, particularly with regard to the specifity of questions and probing about live births. As the SRS approach asked specifically about the intendess of pregnancies which resulted in live births, in addition to those

which were not carried to term, it may have been subjected to more *ex post* rationalization of unwanted pregnancies, which may have led to our finding virtually all attempted abortions to be successful in the SRS data. Additionally, as the study followed a cross-sectional design, we cannot exclude the possibility of endogeneity between the reports of abortion attempts, on the one hand, and knowledge and attitudes regarding the legality of abortion, on the other hand, in our SRS models. Finally, due to the small number of demographic variables we collected about respondents' network members, our analysis of the determinants of reporting of abortion attempts was limited, and certainly excluded many important predictors, including the gender composition of living children, a particularly important factor in India were sex-selective abortion is believed to be common.

References

Abernathy JR, BG Greenberg, and DG Horvitz. 1970. Estimates of induced abortion in urban North Carolina. *Demography* 7(1):19-29.

Anderson BA, K Katus, A Puur, and BD Silver. 1994. The validity of survey responses on abortion: Evidence from Estonia. *Demography* 31(1):115-32.

Barge S, ME Khan, S Rajagopal, N Kumar, and S Kumber. 1998. Availability and quality of MTP services in Gujarat, Maharashtra, Tamil Nadu and Uttar Pradesh: An in-depth study. Paper presented at the International Workshop on Abortion Facilities and Post-Abortion Care in the Context of RCH Programme. New Delhi, India.

Barge S. 2001. A qualitative study of decision process in seeking abortion. Paper presented at the XXIV General Population Conference of the IUSSP, Salvador, Brazil.

Barreto T, O Campbell, JDavies, V Fauveau, V Filippi, W Graham, M Mamdani, C Rooney, and N Toubia. 1992. Investigating induced abortion in developing countries: Methods and problems. *Studies in Family Planning* 23(3):159-70.

Berer M. 2000. Making abortion safe: A matter of good public health policy and practice. *Bulletin of the World Health Organization* 78(5):580-92.

Boerma JT, and JK Mati. 1989. Identifying maternal mortality through networking: Results from coastal Kenya. *Studies in Family Planning* 20(5):245-53.

Bongaarts J. 1978. A framework for analyzing the proximate determinants of fertility. *Population and Development Review* 4(1):105-32.

Bongaarts J. 1982. The fertility-inhibiting effects of the intermediate fertility variables. *Studies in Family Planning* 13(6/7):179-89.

Bongaarts J, and RG Potter. 1983. *Fertility, Biology, and Behavior: An Analysis of the Proximate Determinants*. New York: Academic Press.

Bracken H, B Elul, S Verma, and K Lockwood. 2004. *Unintended Pregnancy and Abortion: A Qualitative Study in Rajasthan – Summary Report.* New Delhi: Population Council. Forthcoming.

Brown SS, and L Eisenberg, eds. 1995. *The Best Intentions: Unintended Pregnancy and the Well-Being of Children and Families.* Washington, DC: National Academy Press, Committee on Unwanted Pregnancy, Institute of Medicine.

Chhabra R, and SC Nuna. 1994. *Abortion in India: An Overview*. New Delhi: Veeremdra Printers.

Chow LP, W Gruhn, and WP Chang. 1979. Feasibility of the randomized response technique in rural Ethiopia. *American Journal of Public Health* 69(3):273-76.

Czech Statistical Office, World Health Organisation, and Centers for Disease Control. 1995. 1993 Czech Republic Reproductive Health Survey: Final Report. Atlanta: Centers for Disease Control.

Elul B, S Barge, S Verma, N Kumar, H Sadhwani, H Bracken, S Narvekar, V Uttekar, and P Kshatriya. 2004. *Unintended Pregnancy and Abortion: A Community-based Study in Rajasthan – Summary Report.* New Delhi: Population Council. Forthcoming.

Figa-Talameca I, TA Sinnathuray, K Yusof, CK Fong, VT Palan, N Adeeb, P Nylander, A Onifade, A Akin, M Bertan, S Gaslonde, K Edström, O Ayeni, and MA Belsey. 1986. Illegal abortion: An attempt to assess its cost to the health services and its incidence in the community. *International Journal of Health Services* 16(3):375-89.

Foreit KG, and DL Nortman. 1992. A method for calculating rates of induced abortion. *Demography* 29(1):127-37.

Frejka T. 1985. Induced abortion and fertility. *International Family Planning Perspectives* 11(4):125-29.

Fu H, JE Darroch, SK Henshaw, and E Kolb. 1998. Measuring the extent of abortion under-reporting in the 1995 National Survey of Family Growth. *Family Planning Perspectives* 30(3):128-33, 138.

Ganatra BR. 2000a. Induced abortions: Programmatic and policy implications of data emerging from an ongoing study in rural Maharashtra, India. In: C Puri, P Van Look, editors. *Sexual and Reproductive Health: Recent Advances, Future Directions.* New Delhi: New Age International.

Ganatra BR. 2000b. *Abortion research in India–what we know, what we need to know.* In: S Jejeebhoy, R Ramasubban, editors. Women's Reproductive Health in India. New Delhi: Rawat Publications.

Government of India (GOI). 1971. The Medical Termination of Pregnancy Act (Act. No. 34).

Graham W, W Brass, and RW Snow. 1989. Estimating maternal mortality: The sisterhood method. *Studies in Family Planning* 20(3):125-35.

Gupta J. 1993. People like you never agree to get it: An Indian family planning clinic. *Reproductive Health Matters* 1:39-43.

Gupte M, S Bandewar, and H Pisal. 1997. Abortion needs of women in India: A case study of rural Maharashtra. *Reproductive Health Matters* 9:77-86.

Henshaw SK, S Singh, BA Oye-Adeniran, IF Adewole, N Iwere, and YP Cuca. 1998. The incidence of induced abortion in Nigeria. *International Family Planning Perspectives* 24(4):156-64.

Huntington D, B Mensch, and N Toubia. 1993. A new approach to eliciting information about induced abortion. *Studies in Family Planning* 24(2):120-24.

Huntington D, B Mensch, and VC Miller. 1996. Survey questions for the measurement of induced abortion. *Studies in Family Planning* 27(3):155-61.

Huntington D, L Nawar, EO Hassan, H Youssef, and N Abdel-Tawab. 1998. The postabortion caseload in Egyptian hospitals: A descriptive study. *International Family Planning Perspectives* 24(1):25-31.

Jagannathan R. 2001. Relying on surveys to understand abortion behavior: Some cautionary evidence. *American Journal of Public Health* 91(11):1825-31.

Johnston HB, and KH Hill. 1996. Induced abortion in the developing world: Indirect estimates. *International Family Planning Perspectives* 22(3):108-14.

Johnston HB. 1999. *Induced Abortion in the Developing World: Evaluating an Indirect Estimation Technique*. Johns Hopkins University School of Public Health. Doctoral dissertation. Unpublished.

Johnston HB. 2002. *Abortion practice in India. A review of the literature*. Mumbai: Centre for Enquiry into Health and Allied Themes (CEHAT), Research Centre for Anusandhan Trust.

Jones EF, and JD Forrest. 1992. Underreporting of abortion in surveys of U.S. women: 1976 to 1988. *Demography* 29(1):113-26.

Kalton G, and DW Anderson. 1986. Sampling rare populations. *Journal of the Royal Statistical Society* 149(part 1):65-82.

Khan ME, S Barge, N Kumar, and S Almroth. 1999. Abortion in India: Current situation and future challenges. In: S Pachauri, editor. *Implementing a Reproductive Health Agenda in India: The Beginning*. New Delhi: Population Council.

Koster-Oyekan W. 1998. Why resort to illegal abortion in Zambia? Findings of a community-based study in Western province. *Social Science and Medicine* 46(10):1303-12.

Lara D, J Strickler, C Diaz-Olavarrieta, and C Ellertson. 2004. Measuring induced abortion in Mexico: A comparison of four methodologies. *Sociological Methods and Research*. In Press.

Laumann EO, JH Gagnon, S Michaels, RT Michael, and JS Coleman. 1989. Monitoring the AIDS epidemic in the United States: A network approach. *Science* 244:1186-1189.

Laumann EO, JH Gagnon, S Michaels, RT Michael, and LP Schumm. 1993. Monitoring AIDS and other rare population events: A network approach. *Journal of Health and SocialBehavior* 34(1):7-22.

Lee NH. 1969. *The Search for an Abortionist*. Chicago: University of Chicago Press.

Makinwa-Adebousoye P, S Singh, and S Audam. 1997. Nigerian health professionals' perceptions about abortion practices. *International Family Planning Perspectives* 23(4):148-54.

Malhotra A, L Nyblade, S Parasuraman, K MacQuarrie, N Kashyap, and S Walia, 2003. *Realizing Reproductive Choice and Rights: Abortion and Contraception in India. ICRW Research Report*. Washington, DC: International Center for Research on Women.

Mosher WD. 1998. Design and operation of the 1995 National Survey of Family Growth. *Family Planning Perspectives* 30(1):43-6.

Mpangile GS, MT Leshabari, and DJ Kihwele. 1999. Induced abortion in Dar es Salaam, Tanzania: The plight of adolescents. In: AI Mundigo, C Indriso, editors. *Abortion in the Developing World*. New Delhi: Vistaar Publications.

Okonofua FE, C Odimegwu, H Ajabor, PH Daru, and A Johnson. 1999. Assessing the prevalence and determinants of unwanted pregnancy and induced abortion in Nigeria. *Studies in Family Planning* 30(1):67-77.

Olinto MTA, and C Victora. Obtaining sensitive information through household surveys: The ballot-box method. Unpublished, undated.

Pritchett LH. 1994. Desired fertility and the impact of population policies. *Population and Development Review* 20(1):1-55.

Rahman M, J DaVanzo, and A Razzaque. 2001. Do better family planning programs reduce abortion in Bangladesh? *The Lancet* 358(9287):1051-56.

Ramachandar L, and PJ Pelto. 2002. The role of village health nurses (VHNs) in mediating abortions in rural Tamil Nadu, India. *Reproductive Health Matters* 10(19):64-75.

Renne E. 1997. Changing patterns of child-spacing and abortion in a northern Nigerian town. Office of Population Research Working Paper 97-1. Princeton: Princeton University.

Rossier C. 2002. *Measure and meaning of induced abortion in rural Burkina Faso*. University of California, Berkeley, Department of Demography. Doctoral dissertation. Unpublished.

Rossier C. 2003. Estimating induced abortion rates: A review. *Studies in Family Planning* 34(2):87-102.

Rossier C, G Guiella, A Ouédraogo, and B Thiéba. 2003. Avortement clandestin à Ouagadougou et consequences sur la sante des femmes: Une étude basée sur la méthode des confidantes. Paper presented at the African Population Conference, Tunis, Tunisia.

Sheriar NK. Navigating the MTP Act in Clinical Practice. Unpublished, undated.

Singh S, and D Wulf. 1994. Estimated levels of abortion in six Latin American countries. *International Family Planning Perspectives* 20(1):4-13.

Singh S, and G Sedgh. 1997. The relationship of abortion to trends in contraception and fertility in Brazil, Colombia and Mexico. *International Family Planning Perspectives* 23(1):4-14.

Singh S, D Wulf, and H Jones. 1997. Health professionals' perceptions about induced abortion in South Central and Southeast Asia. *International Family Planning Perspectives*. 23(2):59-67, 72.

Sirken M. 1970. Household surveys with multiplicity. *Journal of the American Statistical Association* 65(329):257-66.

Sirken M. 1972. Stratified sample surveys with multiplicity. *Journal of the American Statistical Association* 67(337):224-27.

Smith LB, NE Adler, and JM Tschann. 1999. Underreporting sensitive behaviors: The case of young women's willingness to report abortion. *Health Psychology* 18(1): 37-43.

Sood M, Y Juneja, and U Goyal. 1995. Maternal mortality and morbidity associated with clandestine abortions. *Journal of the Indian Medical Association* 93(2):77-79.

Sudman S, M Sirken, and C Cowan. 1988. Sampling rare and elusive populations. *Science* 240:991-96.

Tezcan S, and A Omran. 1981. Prevalence and reporting of induced abortion in Turkey: Two survey techniques. *Studies in Family Planning* 12(6/7):262-71.

Tietze C, and J Bongaarts. 1976. The demographic effect of induced abortion. *Obstetrical and Gynecological Survey* 31(10):699-709.

Van der Poel, MGM. 1993. Delineating personal support networks. *Social Networks* 15:49-70.

Visaria L, V Ramachandran, B Ganatra and S Kalyanwala. 2003. *Abortion in India: Overview and Synthesis of Emerging Issues from the Qualitative Studies.* Jaipur: Healthwatch and CEHAT.

World Health Organization (WHO). 1987. Protocol for hospital-based descriptive studies of mortality, morbidity related to induced abortion. Task Force on Safety and Efficacy of Fertility Regulating Methods. Geneva: WHO.

Zamudio L, N Rubiano, and L Wartenberg. 1999. The incidence and personal and demographic characteristics of abortion in Colombia. In: AI Mundigo, C Indriso, editors. *Abortion in the Developing World*. New Delhi: Vistaar Publications

Table 1: Questions used to measure unintended pregnancy and induced abortion, by estimation methodology.

SRS method		ATPR method	
Question	**Response options**	**Question**	**Response options**
Unwanted pregnancy		**Unwanted pregnancy**	
For each child born in the five years preceding the survey: It is quite common for people to have pregnancies when they are not ready or when they do not want them. Was your pregnancy with (child's name) wanted at that time?	Yes Never thought of No	As far as you know, in the past five years, has she had a pregnancy that she was not ready for or did not want?	Yes No Do not know
For each pregnancy that did not result in a child and occurred between the birth of children born in the five years preceding the survey: Were these pregnancies wanted at that time?	Yes Never thought of No		
Abortion		**Abortion**	
For each child born in the five years preceding the survey: Sometimes when people have pregnancies that are unwanted or they are not ready for, they may try to stop them. Did you try to stop the pregnancy with (child's name)?	No, accepted pregnancy Yes, attempted to abort but failed	Did she try to stop that pregnancy? Did she succeed in stopping that pregnancy?	Yes No Do not know
For each pregnancy that did not result in a child and occurred between the birth of children born in the five years preceding the survey: What was the outcome of these pregnancies?	Spontaneous abortion Induced abortion Still birth		
Abortion complications		**Abortion complications**	
Did you have any complications after your abortion?	Yes No	Did she have any complications from the termination?	Yes No Do not know
Did you seek care from a health-care provide for any of your complications?	Yes No	Did she seek care from a health-care provider for any of her complications?	Yes No Do not know

Table 2: Percentage distribution of survey respondents' and survey respondents' network members' background characteristics, by geographic area.

	Total			Urban			Rural		
	Survey respondents	**Network members**	**p-value**	**Survey respondents**	**Network members**	**p-value**	**Survey respondents**	**Network members**	**p-value**
Age (years)	n=3266	n=4262	0.000	n=1969	n=2577	0.000	n=1297	n=1685	0.050
15-24	27.7	28.2		23.7	24.3		33.7	34.2	
25-34	42.1	46.2		42.9	47.6		40.9	44.2	
35-44	30.2	25.6		33.4	28.1		25.4	21.8	
Mean age (years)	29.9	28.9	0.000	30.6	29.6	0.000	28.9	27.8	0.001
Living children	n=3266	n=4283		n=1969	n=2583		n=1297	n=1700	
0-1 living children	25.9	33.0	0.000	25.6	31.9	0.000	26.5	34.6	0.000
2-4 living children	58.1	56.1		60.8	59.5		54.1	51.1	
5 or more living children	15.9	10.9		13.6	8.6		19.4	14.3	
Mean number of living children	2.8	2.3	0.000	2.7	2.3	0.000	2.9	2.4	0.000
Literacy	n=3266	n=4291	0.000	n=1969	n=2585	0.000	n=1297	n=1706	0.000
Literate	39.3	47.6		54.0	63.5		17.1	23.6	
Illiterate	60.7	52.4		46.0	36.5		82.9	76.4	
Years of schooling completed	n=3266	n=4252		n=1969	n=2550	0.000	n=1293	n=1702	0.000
None	61.5	53.4	0.000	46.6	37.5		84.3	77.1	
1-7	13.5	13.3		15.7	14.4		10.1	11.8	
8-9	8.8	9.0		12.6	11.0		3.0	5.9	
10 or more	16.1	24.3		25.0	37.1		2.6	5.1	
Religion	n=3266	n=4306	0.415	n=1969	n=2597	0.201	n=1297	n=1709	0.477
Hindu	82.9	83.7		76.0	77.6		93.5	92.9	
Non-Hindu	14.3	13.1		24.0	22.4		6.2	7.0	
Caste	n=3250	n=4048	0.286	n=1965	n=2416	0.600	n=1285	n=1632	0.097
Scheduled caste or tribe	29.3	27.6		21.5	20.6		41.2	38.1	
Other backward class	38.6	39.6		37.0	38.4		41.0	41.5	
Higher caste	32.1	32.8		41.5	41.1		17.7	20.5	

Note: Differences in sample sizes due to missing information. P-value refers to difference between method of data collection.

Table 3: Percentage distribution of respondents' relationships with network members, by geographic area.

	Total	Urban	Rural	p-value
Extent of friendship	n=4280	n=2582	n=1698	0.078
Considered close friend	1.7	2.0	1.3	
Not considered close friend	98.3	98.0	98.7	
Intimacy	n=4306	n=2597	n=1709	0.550
First network member named	57.4	57.1	58.1	
Second to fifth network member named	42.6	42.9	41.9	
Relationship	n=4306	n=2597	n=1709	0.000
Friend	57.5	60.8	52.6	
Neighbor	7.2	6.6	8.0	
Sister	14.9	15.2	14.4	
Sister-in-law	17.4	15.4	20.4	
Other family	3.0	2.0	4.6	
Frequency of contact	n=4297	n=2588	n=1709	0.000
Daily	43.5	39.0	50.2	
Weekly	6.8	8.7	4.0	
Bi-monthly	2.8	3.4	2.0	
Monthly	15.2	14.3	16.5	
Every several months	31.7	34.7	27.2	
Duration of relationship	n=4283	n=2582	n=1701	0.000
<3 years	8.8	7.4	11.1	
3-6 years	7.4	7.3	7.6	
>6 years	83.7	85.3	81.3	

Note: Differences in sample sizes due to missing information.

P-value refers to difference between rural and urban network members.

Table 4: Percentage distribution of question items respondents were able to answer with regard to their confidantes, by geographic area.

	Total	Urban	Rural	p-value
Age[a]	99.0	99.2	98.6	0.043
Literacy[a]	100.0	99.7	100.0	0.543
Ever attended school[b]	99.6	99.7	99.3	0.196
Completed school years[c]	98.5	98.2	99.7	0.020
Number of children[a]	99.5	99.5	99.5	0.956
Religion[a]	100.0	100.0	100.0	na
Caste/tribe[a]	100.0	100.0	100.0	na
Had unwanted pregnancy in past five years[a]	97.2	96.8	97.8	0.059
Attempted to terminate unintended pregnancy[d]	98.5	97.6	100.0	0.085
Succeeded in terminated unintended pregnancy[e]	99.3	97.9	100.0	0.340
Abortion resulted in complications[f]	85.1	83.3	86.0	1.000
Sought treatment for complications[g]	90.9	95.8	85.0	0.253

Note: P-value refers to difference between rural and urban network members.

[a] Among all confidantes.

[b] Among literate confidantes.

[c] Among confidantes who ever attended school.

[d] Among confidantes who had an unwanted pregnancy.

[e] Among confidantes who attempted abortion.

[f] Among confidantes with successful abortions.

[g] Among confidantes who experienced complications.

Table 5. Prevalence of unwanted pregnancy, abortion attempts and outcomes within five years preceding survey, by estimation methodology and geographic area. %

	Total			Urban			Rural		
	SRS	ATPR	p-value	SRS	ATPR	p-value	SRS	ATPR	p-value
Had unwanted pregnancy[a]	n=3266	n=4147		n=1969	n=2476		n=1297	n=1671	
	12.0	9.8	0.003	13.5	9.9	0.000	9.7	9.8	0.971
Attempted abortion[b]	n=392	n=406		n=266	n=243		n=126	n=163	
	52.6	34.7	0.000	58.7	38.3	0.000	39.7	29.5	0.063
Had successful abortion[c]	n=206	n=140		n=156	n=93		n=50	n=47	
	98.5	58.6	0.000	98.7	65.6	0.000	98.0	44.7	0.000
Experienced complications[d]	n=203	n=76		n=154	n=56		n=49	n=20	
	26.1	27.6	0.798	25.3	23.2	0.754	28.6	40.0	0.355
Sought treatment for complications[e]	n=53	n=17		n=39	n=12		n=14	n=5	
	45.3	88.2	0.002	38.5	91.7	0.001	64.3	80.0	0.516

Note: Differences in sample sizes due to missing information and filter questions. P-value refers to difference between methods of data collection.

a Among all eligible women.

[b] Among women who had an unwanted pregnancy.

[c] Among women who attempted abortion.

[d] Among women with successful abortions.

[e] Among women who experienced complications.

Table 6. Prevalence of unwanted pregnancy, abortion attempts and outcomes within five years preceding survey for ATPR estimation methodology, by network characteristics. %

Network characteristic	Had unwanted pregnancy	Attempted abortion	Had successful abortion	Experienced complications	Sought treatment for complications
Intimacy of relationship					
Confidante named first in network	10.8 **	32.8	56.1	31.7	81.8
Confidante named later in network	8.6	38.0	62.1	22.7	100.0
Type of relationship					
Friend or neighbor	9.2 **	35.4	62.4	26.5	88.9
Family-member	11.1	33.7	52.7	29.6	87.5
Duration of relationship					
≥ 6 years	9.8	34.9	59.0	29.7	93.3
> 6 years	9.7	33.9	59.1	16.7	50.0
Frequency of contact					
Daily	11*	35.5 **	54.9	33.3	80.0
Weekly, bi-monthly or monthly	9.1	45.7	64.3	28.0	100.0
Every several months	8.8	24.3	59.3	13.3	100.0

Note: * Difference between network characteristic significant at the 0.10 level. ** Difference between network characteristic significant at the 0.05 level.

Table 7: Bivariate log odds of reporting an attempted abortion in the five years preceding the survey, for total sample and by estimation methodology.

	Total			SRS			ATPR		
	OR	**95% CI**	**p-value**	**OR**	**95% CI**	**p-value**	**OR**	**95% CI**	**p-value**
Estimation method									
SRS (ref)	1.000								
ATPR	0.423	0.338 - 0.528	0.000	na			na		
Abortion stigma factors									
Knowledge of legislation									
Believe abortion is illegal (ref)	1.000			1.000			1.000		
Believe abortion is legal	1.458	1.127 - 1.886	0.004	2.030	1.505 - 2.739	0.000	0.803	0.4918 - 1.311	0.380
Attitudes towards abortion									
Conservative	0.466	0.244 - 0.887	0.020	0.227	0.821 - 0.630	0.004	0.988	0.461 - 2.122	0.977
Moderate (ref)	1.000			1.000			1.000		
Liberal	1.402	1.103 - 1.782	0.006	1.561	1.170 - 2.083	0.002	1.173	0.791 - 1.743	0.427
Demographic control variables									
Residence									
Rural (ref)	1.000			1.000			1.000		
Urban	1.750	1.372 - 2.239	0.000	2.150	1.591 - 2.906	0.000	1.288	0.198 - 1.895	0.198
Religion									
Hindu (ref)	1.000			1.000			1.000		
Non-Hindu	1.356	1.041 - 1.764	0.024	1.595	1.169 - 2.176	0.003	0.997	0.625 - 1.592	0.991
Age (years)									
15-24 (ref)	1.000			1.000			1.000		
25-34	2.103	1.575 - 2.808	0.000	2.887	1.977 - 4.215	0.000	1.322	0.872 - 2.005	0.059
35-44	1.217	0.869 - 1.705	0.254	1.353	0.875 - 2.091	0.174	1.101	0.672 - 1.805	0.740
Living children (number)									
0-1 (ref)	1.000			1.000			1.000		
2-4	1.774	1.440 - 2.366	0.000	1.876	1.290 - 2.738	0.001	1.643	1.076 - 2.507	0.021
5-10	2.910	2.074 - 4.083	0.000	2.938	1.913 - 4.513	0.000	2.943	1.684 - 5.144	0.000
Literacy									
Unable to read/write (ref)	1.000			1.000			1.000		
Able to read/write	1.458	1.127 - 1.886	0.004	1.598	1.230 - 2.077	0.000	1.124	0.786 - 1.607	0.523
Network factors									
Relationship									
Friend/neighbor (ref)	na			na			1.000		
Family	na			na			1.180	0.811 - 1.716	0.387
Frequency of contact									
Daily (ref)	na			na			1.000		
Weekly, bi-monthly or monthly	na			na			1.025	0.679 - 1.545	0.908
Every several months	na			na			0.504	0.313 - 0.815	0.005
Duration of relationship									
≤ 6 years (ref)	na			na			1.000		
> 6 years	na			na			0.960	0.600 - 1.533	0.863
Intimacy of relationship									
1st network member named (ref)	na			na			1.000		
2nd - 5th network member named	na			na			0.939	0.671 - 1.315	0.716

Notes: Ref=reference group. Estimates take into account clustering by household (Total and SRS) and by woman (ATPR). Estimates for total sample control for estimation method.

Table 8: Multivariate log odds of reporting an attempted abortion in the five years preceding the survey for total sample and by estimation methodology.

	Total						SRS						ATPR					
	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6			Model 7		
	Abortion stigma factors only			Abortion stigma factors and demographic controls			Abortion stigma factors only			Abortion stigma factors and demographic controls			Abortion stigma factors only			Abortion stigma factors and demographic controls			Abortion stigma factors, demographic controls and network factors		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Estimation method																					
SRS (ref)	1.000			1.000			na			na			na			na			na		
ATPR	0.410	0.327 - 0.514	0.000	0.425	0.336 - 0.535	0.000	na			na			na			na			na		
Abortion stigma factors																					
Knowledge of legislation																					
Believe abortion is illegal (ref)	1.000			1.000			1.000			1.000			1.000			1.000			1.000		
Believe abortion is legal	1.326	1.012 - 1.737	0.040	1.296	0.987 - 1.700	0.061	1.785	1.309 - 2.434	0.000	1.778	1.296 - 2.441	0.000	0.773	0.462 - 1.291	0.324	0.743	0.442 - 1.251	0.264	0.774	0.460 - 1.300	0.333
Attitudes towards abortion																					
Conservative	0.478	0.252 - 0.911	0.025	0.533	0.279 - 1.021	0.058	0.242	0.088 - 0.667	0.006	0.279	0.099 - 0.780	0.015	0.967	0.449 - 2.079	0.931	1.000	0.463 - 2.178	0.991	1.008	0.464 - 2.187	0.984
Moderate (ref)	1.000			1.000			1.000			1.000			1.000			1.000			1.000		
Liberal	1.358	1.058 - 1.743	0.016	1.310	1.017 - 1.687	0.037	1.463	1.091 - 1.961	0.011	1.381	1.024 - 1.863	0.034	1.207	0.801 - 1.818	0.369	1.214	0.800 - 1.841	0.362	1.235	0.809 - 1.883	0.328
Demographic control variables																					
Residence																					
Rural (ref)	na			1.000			na			1.000			na			1.000			1.000		
Urban	na			1.554	1.174 - 2.055	0.002	na			1.773	1.251 - 2.513	0.001	na			1.330	0.857 - 2.063	0.203	1.356	0.864 - 2.127	0.186
Religion																					
Hindu (ref)	na			1.000			na			1.000			na			1.000			1.000		
Non-Hindu	na			1.104	0.839 - 1.454	0.480	na			1.266	0.915 - 1.753	0.155	na			0.854	0.525 - 1.389	0.524	0.836	0.513 - 1.364	0.474
Age (years)																					
15-24 (ref)	na			1.000			na			1.000			na			1.000			1.000		
25-34	na			1.358	0.979 - 1.884	0.067	na			1.815	1.183 - 2.784	0.006	na			0.929	0.585 - 1.476	0.756	0.920	0.574 - 1.474	0.728
35-44	na			0.636	0.426 - 0.947	0.026	na			0.665	0.398 - 1.113	0.121	na			0.644	0.358 - 1.159	0.142	0.605	0.335 - 1.095	0.097
Living children (number)																					
0-1 (ref)	na			1.000			na			1.000			na			1.000			1.000		
2-4	na			1.762	1.272 - 2.439	0.001	na			1.698	1.103 - 2.615	0.016	na			1.812	1.125 - 2.918	0.015	1.759	1.082 - 2.860	0.023
5-10	na			4.076	2.740 - 6.061	0.000	na			4.158	2.450 - 7.056	0.000	na			3.995	2.142 - 7.452	0.000	3.685	1.945 - 6,982	0.000
Literacy																					
Unable to read/write (ref)	na			1.000			na			1.000			na			1.000			1.000		
Able to read/write	na			1.312	1.026 - 1.689	0.031	na			1.437	1.052 - 1.964	0.023	na			1.158	0.779 - 1.718	0.468	1.222	0.829 - 1.802	0.310
Network factors																					
Relationship																					
Friend/neighbor (ref)	na			na			na			na			na			na			1.000		
Family	na			na			na			na			na			na			1.285	0.882 - 1.873	0.192
Frequency of contact																					
Daily (ref)	na			na			na			na			na			na			1.000		
Weekly, bi-monthly or monthly	na			na			na			na			na			na			1.029	0.672 - 1.577	0.895
Every several months	na			na			na			na			na			na			0.579	0.350 - 0.959	0.034
Duration of relationship																					
≤ 6 years (ref)	na			na			na			na			na			na			1.000		
> 6 years	na			na			na			na			na			na			0.827	0.499 - 1.371	
Intimacy of relationship																					
1st network member named (ref)	na			na			na			na			na			na			1.000		
2nd - 5th network member named	na			na			na			na			na			na			1.030	0.725 - 1.464	0.868
N	7527			7452			3250			3250			4277			4202			4173		
F-statistic	17.91			14.70			12.99			12.08			0.46			3.12			2.77		

Notes: All p-values are from the ? test, ref=reference group, estimates take into clustering by household (SRS and ATPR models) and by woman (ATPR models).