

**DRAFT: PLEASE DO NOT CITE WITHOUT PERMISSION.**

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

Batya Elul, Ph.D.  
Program Associate, Population Council (Formerly)  
Associate Research Scientist, International Center for AIDS Care and Treatment  
Programs, Columbia University (Currently)

**Correspondence:** Batya Elul, International Center for AIDS Care and Treatment Programs, Mailman School of Public Health, Columbia University, 722 W. 168<sup>th</sup> Street, 7<sup>th</sup> Floor, New York, NY 10032; email: [be2124@columbia.edu](mailto:be2124@columbia.edu); tel: 1-212-342-2803.

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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, warranting investigation of innovative approaches for estimating this important determinant of fertility.

**Objectives:** To 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 to compare those estimates with those from self-reported survey (SRS) data in a household survey of 3266 women in Rajasthan, India.

**Methods:** We compare estimates for unwanted pregnancy, abortion attempts, successful abortions, abortion complication rates and treatment-seeking behavior for complications across the two methods. Regression analysis is used to further investigate the effect of the method of data collection on reporting of abortion attempts and to assess the impact of respondent's knowledge of the legality of abortion in India and their abortion attitudes on reporting.

**Results:** The ATPR method yielded significantly higher rates of unintended pregnancy, lower rates of attempted abortion and successful abortion, similar rates of complications and higher rates of treatment seeking behaviors for complications than the SRS method. Regression analysis showed roughly a 35% decrease in reporting of attempted abortion for the ATPR method when compared to the SRS method, even after controlling for

respondent's demographic characteristics and their knowledge of and opinions about abortion legality. After allowing the effect of respondent's knowledge of and opinions about abortion legality to vary by method of data collection, however, the SRS method was found to be subject to more under-reporting when women perceived abortion to be illegal or had conservative attitudes towards abortion than the ATPR method.

**Conclusion:** Given the potential for the ATPR method to minimize under-reporting of abortion experiences due to abortion stigma, this method merits further attention. Future efforts should focus 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 improve information on 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 and frequently unsafe 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 (Gupte et al, 1997; Ganatra, 2000a; Sheriar, 2001; 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 3% to 18% 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 <sup>1</sup>**

### **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

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<sup>1</sup> 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).

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, 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-Talamanca 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 the 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). Recent research in Mexico, however, estimated this proportion 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-Talamanca 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 of study settings, individuals belonging to sub-populations in which abortion is particularly stigmatized (i.e. ethnicity, marital status, number of living children) were consistently far less likely to report recent abortions.

Recognizing women's discomfort in disclosing abortions in FTF interviews, researchers have adopted two main approaches to minimize under-reporting of abortions 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 as value-free a 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 a box or closed receptacle, 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).

In the RRT, which has been used to collect information on sensitive topics for many years, the respondent randomly selects 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), Mexico (Lara et al, 2004), and Thailand (Manopaiboon et al, 2003). As it can be used by illiterate respondents and provides individual-level abortion information, ACASI redresses some of the limitations of the SAQ and RRT. 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 the other methods 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<sup>2</sup>:

$$\text{TFR} = \text{TF} * C_m * C_c * C_a * C_i$$

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.

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

$$C_a = \text{TFR} / (\text{TF} * C_m * C_c * C_i)$$

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

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<sup>2</sup> 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.

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 data (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**

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)<sup>3</sup> 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).

The literature on abortion is replete with studies demonstrating that personal networks are a key 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

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<sup>3</sup> Demographers refer to this as the “sisterhood method” of measuring maternal mortality.

detailed example of the diffusion process comes from Lee (1969), who documented the processes and pathways which 114 women followed to terminate unwanted pregnancies in the United States before the legalization of abortion. In Lee's 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 had 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 perform an abortion. Finally, following their procedures, women continued to share their abortion experiences with others in their personal networks, mainly female friends, and, in many cases, told more individuals about their abortions after they occurred than they did 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 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; Tezcan and Omran, 1981; Jones and Forrest, 1992; Mosher, 1998; Lara et al, 2004), we

hypothesized that a method that completely removes self-reports would yield higher estimates of abortion.

## **Data collection**

### **Abortion estimation methodologies**

Both abortion estimation methods tested in this study were embedded 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 to 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.”<sup>4,5</sup> By delineating

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<sup>4</sup> Various approaches to generating personal network members exist (van der Poel, 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 networks, the “exchange” approach yields the most clearly and objectively defined personal support network.

<sup>5</sup> 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

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 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.

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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).

The SRS method was incorporated in the reproductive history section of the study instrument. We used questions on pregnancy intendedness as a segue 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, 1994; Huntington et al, 1996; 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, in addition to 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, we created a list of 200 consecutive households, beginning at a randomly selected spot, in each randomly selected PSU, which served as the sampling frame. In district headquarters and towns, we randomly selected 30 households from the frame, and in villages, we randomly selected 20 households. 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 sub-samples. 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 reporting 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.<sup>6</sup> In addition to a dummy variable for the method of data collection, three sets of factors are considered: demographic variables, abortion stigma factors and interaction terms.

The first set of variables contains typical demographic measures such as age, parity, and literacy.<sup>7</sup> 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.

The second set of variables consists of two proxy measures for abortion stigma, which has been found to decrease abortion reporting 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). The first measure taps respondents' awareness of abortion legality in India and the other describes their attitudes about abortion. Awareness of the legality of abortion was determined using responses to two questions, one asking if abortion was

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<sup>6</sup> 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.

<sup>7</sup> Caste is not considered in these analyses due to problems encountered in coding this variable for the ATPR data (see footnote 16 below). Additionally, education and residence are believed to measure the same underlying construct.

legal in India and another asking if there was a law on abortion in India. Respondents who answered in the affirmative for either were considered to be knowledgeable of the legality of abortion in India. With this measure, 16% of respondents (urban: 19%; rural: 13%) were coded as being aware of the legal status of abortion. We similarly developed a dummy measure 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 were 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 were considered to have liberal views if they supported abortion in six or more of these situations, including all four pertaining to the law. Conservatives were defined as those who supported abortion in three or fewer conditions, and only two or fewer of these could pertain to the law. Respondents who were neither conservative nor liberal were classified as moderate. Using this index, 8% of respondents (urban: 6%; rural: 13%) were conservative, 37% moderate (urban: 35%; rural: 40%) and 55% liberal (urban: 59%; rural: 47%).

The final set of factors consists of interaction terms for the method of data collection and respondents' awareness of the legality of abortion, as well as their attitudes towards abortion. If the ATPR method successfully avoids under-reporting due to the stigma of abortion, we expect the interaction terms to be significant. More specifically, we hypothesize that respondents who are aware that abortion is legal in India and/or have

more liberal attitudes towards abortion are more likely to report their own abortion attempts with the SRS method, but that their abortion legislative knowledge and attitudes do not impact reporting of their network members' abortion attempts when the ATPR method is used.

At the multivariate level, we construct the models incrementally. We start first with the method dummy variable, add the demographic factors, the abortion knowledge and attitude variables, and finally the interaction terms. All analyses account for clustering at the household and respondent levels, 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, 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, both 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.<sup>8</sup> 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. Surprisingly, only when queried

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<sup>8</sup> 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.

about complications following abortions among their confidantes was a decrease in reporting observed (83.3% - 95.8% of cases), particularly among our rural sample.

### *Experiences with unwanted pregnancy and abortion*

With both the SRS and the ATPR methods, we obtained overall unwanted pregnancy rates between 5.0% to 9.9% (Table 5). While the ATPR method yielded statistically significantly higher unwanted pregnancy rates than the SRS method for all women (SRS: 8.0%; ATPR: 9.8%) and for rural women (SRS: 5.0%; ATPR: 9.8%), there was no difference in unwanted pregnancy rates for the urban sample (SRS: 9.9%; ATPR: 9.9%).

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 65.4% of the 260 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 406 confidantes reported to have had unwanted pregnancies in the past five years attempted to terminate them. The SRS method yielded higher rates of attempted abortion even when the data were disaggregated by geographic residence. Both methods, however, suggest that urban women were roughly ten percentage points more likely to attempt termination of an unwanted pregnancy than rural women.

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 (83.5%), and one that is nearly one and one-half times the rate observed when the ATPR method is used (58.6%). Not surprisingly, given poor access to abortion services in rural India, both methods of data collection suggest urban women (SRS: 85.0%; ATPR: 65.6%) were more successful in terminating unwanted pregnancies than their rural counterparts (SRS: 78.4%; ATPR: 44.7%). The geographic residence differential, however, was substantially greater for the ATPR data (20.9%) than for the SRS data (6.6%).

As for complication rates, both methods indicate high rates (>20%) 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 (>50%), the ATPR method produced a rate of 88.2% (of 17 confidantes), nearly one and one-half times that observed with the SRS method (53.1%). 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 finding may result from the fact that network members whom 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).<sup>9</sup>

## **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, after controlling for the method of data collection. We see that the method of data collection is significantly associated with the likelihood of reporting an abortion attempt. Indeed, relative to the SRS method, the ATPR method is 38% less 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. We also find significant relationships

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<sup>9</sup> 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.

between reporting of abortion attempts and each of the demographic and abortion stigma variables, except for religion.

### *Multivariate results*

In Table 8, we examine the effects of these factors taken together on reporting of abortion attempts. Model 1 contains only the dummy variable for the method of data collection, the demographic variables are added in Model 2, the abortion stigma variables in Model 3 and the interaction terms in Model 4.

Models 2 and 3 indicate that even after controlling for the demographic and abortion stigma factors, the ATPR method yields roughly a 35% lower likelihood of reports of attempted abortion than the SRS method. Moreover, when we control for the method of data collection and demographic factors, the effect of the variables serving as proxies for abortion stigma 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 reports of abortion attempts at the bivariate level, these relationships lose significance at the multivariate level (Model 3). When the interaction terms are added in Model 4, however, an important relative advantage of the ATPR method emerges. Each of the interaction terms is significant, confirming that the effect of respondents' knowledge about the legality of abortion in India and their attitudes towards abortion varies by the estimation method: Indeed, while respondents who knew that abortion was legal were 89% more likely to report their own abortions, having this information did not impact the likelihood of their reporting an abortion among their

network members. Similarly, respondents who had conservative attitudes towards abortion were 81% less likely to report their own abortions than those who had moderate attitudes towards abortion, but were no less likely to report an abortion among their confidantes. Analyses not shown found no evidence of interaction term between the method of data collection and geographic residence.

## **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 comparing 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 the SRS method: an increase in the effective study sample size and a decrease in the 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, the ATPR estimates of attempted and successful abortion were substantially lower than the SRS estimates. Indeed, two of our multivariate analyses demonstrated that the ATPR method is 35% as likely to yield a report of attempted abortion, even after controlling for demographic factors and abortion legality knowledge and attitudes. Once we allowed the relationship between respondents' knowledge and attitudes of abortion legality and abortion reporting to vary by the method of data collection, however, 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. This may imply that women in India are still 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, however, 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 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, the ATPR method 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 ever-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 on ATPR reporting of abortions, and potentially other sensitive behaviors. First, further work is required to ascertain how best to identify 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 networks. 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 of the respondents 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 specificity of questions and probing about live births. As the SRS approach asked specifically about the intendedness 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 over 80% of 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 the SRS. 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 where sex-selective abortion is believed to be common.

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

SRS method		ATPR method	
Question	Response options	Question	Response options
<b>Unwanted pregnancy</b> <i>For each child born in the five years preceding the survey:</i> 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	<b>Unwanted pregnancy</b> 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
<i>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:</i> Were these pregnancies wanted at that time?	Yes Never thought of No		
<b>Abortion</b> <i>For each child born in the five years preceding the survey:</i> 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	<b>Abortion</b> Did she try to stop that pregnancy? Did she succeed in stopping that pregnancy?	Yes No Do not know
<i>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:</i> What was the outcome of these pregnancies?	Spontaneous abortion Induced abortion Still birth		
<b>Abortion complications</b> Did you have any complications after your abortion?	Yes No	<b>Abortion complications</b> Did she have any complications from the termination?	Yes No Do not know
Did you seek care from a health-care provider for any 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
<b>Age (years)</b>	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
<b>Living children</b>	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
<b>Literacy</b>	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	
<b>Years of schooling completed</b>	n=3266	n=4252		n=1969	n=2550		n=1293	n=1702	
None	61.5	53.4	0.000	46.6	37.5	0.000	84.3	77.1	0.000
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	
<b>Religion</b>	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	
<b>Caste</b>	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 caste	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 survey respondents and survey respondents' network members.

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

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

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

<sup>a</sup> Among all confidantes.

<sup>b</sup> Among literate confidantes.

<sup>c</sup> Among confidantes who ever attended school.

<sup>d</sup> Among confidantes who had an unwanted pregnancy.

<sup>e</sup> Among confidantes who attempted abortion.

<sup>f</sup> Among confidantes with successful abortions.

<sup>g</sup> 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 <sup>a</sup>	N=3266	n=4147		n=1969	n=2476		n=1297	n=1671	
	8.0	9.8	0.005	9.9	9.9	0.999	5.0	9.8	0.000
Attempted abortion <sup>b</sup>	n=260	n=406		n=195	n=243		n=65	n=163	
	65.4	34.7	0.000	68.2	38.3	0.000	56.9	29.5	0.000
Had successful abortion <sup>c</sup>	n=170	n=140		n=133	n=93		n=37	n=47	
	83.5	58.6	0.000	85.0	65.6	0.001	78.4	44.7	0.002
Experienced complications <sup>d</sup>	n=142	n=76		n=113	n=56		n=29	n=20	
	22.5	27.6	0.403	21.2	23.2	0.770	27.6	40.0	0.362
Sought treatment for complications <sup>e</sup>	n=32	n=17		n=24	n=12		n=8	n=5	
	53.1	88.2	0.014	50.0	91.7	0.014	62.5	80.0	0.506

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

<sup>a</sup> Among all eligible women.

<sup>b</sup> Among women who had an unwanted pregnancy.

<sup>c</sup> Among women who attempted abortion.

<sup>d</sup> Among women with successful abortions.

<sup>e</sup> 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. %**

<b>Network characteristic</b>	<b>Had unwanted pregnancy</b>	<b>Attempted abortion</b>	<b>Had successful abortion</b>	<b>Experienced complications</b>	<b>Sought treatment for complications</b>
<b>Intimacy of relationship</b>					
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
<b>Type of relationship</b>					
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
<b>Duration of relationship</b>					
≥ 6 years	9.8	34.9	59.0	29.7	93.3
> 6 years	9.7	33.9	59.1	16.7	50.0
<b>Frequency of contact</b>					
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.**

	<b>OR</b>	<b>95% CI</b>	<b>p-value</b>
<b>Estimation method</b>			
SRS (ref)	1.000		
ATPR	0.617	0.488 - 0.781	0.000
<b>Demographic factors</b>			
Residence			
Rural (ref)	1.000		
Urban	1.793	1.366 - 2.356	0.000
Religion			
Hindu (ref)	1.000		
Non-Hindu	1.252	0.927 - 1.691	0.142
Age (years)			
15-24 (ref)	1.000		
25-34	2.078	1.504 - 2.870	0.000
35-44	1.276	0.878 - 1.855	0.200
Living children (number)			
0-1 (ref)	1.000		
2-4	2.197	1.573 - 3.068	0.000
5-10	3.567	2.410 - 5.278	0.000
Literacy			
Unable to read/write (ref)	1.000		
Able to read/write	1.370	1.079 - 1.739	0.010
<b>Abortion stigma factors</b>			
Knowledge of legislation			
Believe abortion is illegal (ref)	1.000		
Believe abortion is legal	1.414	1.060 - 1.887	0.018
Attitudes towards abortion			
Conservative	0.485	0.252 - 0.933	0.030
Moderate (ref)	1.000		
Liberal	1.347	1.032 - 1.758	0.028

Notes: Ref=reference group. Estimates take into account clustering by household and by woman. Estimates for demographic and abortion stigma factors control for estimation method.

**Table 8. Multivariate log odds of reporting an attempted abortion in the five years preceding the survey for total sample**

	Model 1			Model 2			Model 3			Model 4		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
<b>Estimation method</b>												
SRS (ref)	1.000			1.000			1.000			1.000		
ATPR	0.617	0.488 - 0.781	0.000	0.645	0.506 - 0.823	0.000	0.635	0.497 - 0.811	0.000	0.813	0.548 - 1.206	0.303
<b>Demographic factors</b>												
Residence												
Rural (ref)	na			1.000			1.000			1.000		
Urban	na			1.737	1.274 - 2.369	0.000	1.649	1.210 - 2.249	0.002	1.674	1.227 - 2.286	0.001
Religion												
Hindu (ref)	na			1.000			1.000			1.000		
Non-Hindu	na			0.991	0.727 - 1.351	0.955	1.001	0.733 - 1.367	0.994	0.999	0.731 - 1.365	0.995
Age (years)												
15-24 (ref)	na			1.000			1.000			1.000		
25-34	na			1.244	0.874 - 1.770	0.225	1.220	0.856 - 1.738	0.271	1.226	0.861 - 1.746	0.259
35-44	na			0.616	0.401 - 0.948	0.027	0.597	0.387 - 0.921	0.020	0.598	0.387 - 0.925	0.021
Living children (number)												
0-1 (ref)	na			1.000			1.000			1.000		
2-4	na			2.276	1.580 - 3.280	0.000	2.272	1.575 - 3.277	0.000	2.271	1.575 - 3.274	0.000
5-10	na			5.109	3.282 - 7.953	0.000	5.210	3.346 - 8.113	0.000	5.288	3.397 - 8.250	0.000
Literacy												
Unable to read/write (ref)	na			1.000			1.000			1.000		
Able to read/write	na			1.373	1.049 - 1.797	0.021	1.287	0.979 - 1.692	0.070	1.274	0.969 - 1.675	0.083
<b>Abortion stigma factors</b>												
Knowledge of legislation												
Believe abortion is illegal (ref)	na			na			1.000			1.000		
Believe abortion is legal	na			na			1.260	0.927 - 1.712	0.140	1.891	1.313 - 2.725	0.001
Attitudes towards abortion												
Conservative	na			na			0.555	0.288 - 1.069	0.078	0.190	0.459 - 0.789	0.022
Moderate (ref)	na			na			1.000			1.000		
Liberal	na			na			1.261	0.952 - 1.672	0.106	1.344	0.947 - 1.908	0.097
<b>Interaction terms</b>												
Estimation method * Knowledge of legislation	na			na			na			na		
Estimation method * Conservative attitudes	na			na			na			na		
Estimation method * Liberal attitudes	na			na			na			na		
<b>Number of observations</b>	7566			7488			7452			7452		
<b>F-statistic (degrees of freedom)</b>	16.14 (1)			13.99 (8)			11.71 (11)			10.53 (14)		

Notes: All p-values are from the t-test, ref=reference group, estimates take into account clustering by household and by woman.