Methodologies for Estimating Abortion Incidence and Abortion-Related Morbidity: A Review

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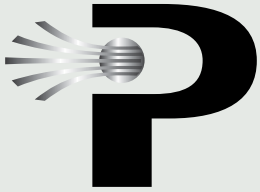

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Guttmacher Institute • International Union for the Scientific Study of Population

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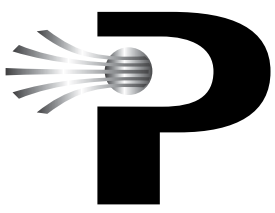

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The volume is based on the International Seminar on Measurement of Abortion Incidence, Abortion-Related Morbidity and Mortality, which took place in Paris, France, in November of 2007. The seminar was convened by the International Union for the Scientific Study of Population (IUSSP) Scientific Panel on Abortion. The panel was chaired by Susheela Singh and included the following members: Sandra G. Garcia, Hailemichael Gebreselassie, Agnes Guillaume, Ali Mohammad Mir and Friday Okonofua. The seminar was supported by funds provided by the UNFPA, the IUSSP, the Centre Population et Développement (CEPED, France), the Centre de Recherche et de Documentation sur l'Amérique Latine (CREDAL, France) and the Population Council, Mexico.

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Abbreviations

ACASI	Audio Computer-Assisted Self-Interview
AFS	Abortion Frequency Survey
AICM	Abortion Incidence Complications Method
ATPR	Anonymous Third Party Reporting
CAMS	Community Abortion Morbidity Study
CBS	Community-Based Survey of Women
CDC	Centers for Disease Control and Prevention, USA
CIHI	Canadian Institute for Health Information
CEPED	Centre Population et Développement, France
CONAPO	Consejo Nacional de Población, Mexico
CREDAL	Centre de Recherche et de Documentation sur l'Amérique Latine, France
D&C	Dilation and Curettage
DALY	Disability Adjusted Life Year
DHS	Demographic and Health Survey
DSS	Demographic Surveillance System
ENNyS	Encuesta Nacional de Nutrición y Salud, Argentina
FGD	Focus Group Discussion
FLASOG	Federación Latinoamericana de Sociedades de Obstetricia y Ginecología
HFS	Health Facilities Survey
HPS	Health Professionals Survey
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
ICD	International Classification of Diseases
ICRW	International Center for Research on Women, USA
IDI	In-depth Interview
IMSS-O	Instituto Mexicano del Seguro Social-Oportunidades
IMSS-RO	Instituto Mexicano del Seguro Social-Regimen Ordinario
ISSSTE	Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado, Mexico
IUSSP	International Union for the Scientific Study of Population
MCH–FP	Maternal Child Health–Family Planning
MDHS	Matlab DHS, Bangladesh
MoH	Ministry of Health
MOLAP	Multi-Dimensional Online Analytical Processing
MMR	Maternal Mortality Ratio
MR	Menstrual Regulation
MTP	Medical Termination of Pregnancy
MVA	Manual Vacuum Aspiration
NFHS	National Family Health Survey, India
NSFG	National Survey of Family Growth, USA
PAC	Postabortion Care
PBT	Preceding Birth Technique
PEMEX	Petróleos Mexicanos, Mexico
PMM	Prospective Morbidity Methodology
RHS	Reproductive Health Survey
RKS	Record Keeping System
RRT	Randomized Response Technique
SAEH	Sistema Automatizado de Egresos Hospitalarios, Mexico
SEDENA	Secretaría de la Defensa Nacional, Mexico
SEM	Sealed Envelope Method
SEMAR	Secretaría de Marina, Mexico
SSa	Secretaría de Salud, Mexico
TAR	Total Abortion Rate
TF	Total Fecundity Rate
TFR	Total Fertility Rate
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
WHO	World Health Organization

Introduction

Lisa Remez, Susheela Singh and Alyssa Tartaglione

The social and political sensitivity surrounding induced abortion makes it very difficult to conduct high-quality research to measure its incidence. This is particularly true where abortion is illegal, but occurs in countries where abortion is broadly legal as well. These same factors also constrain research on morbidity resulting from unsafe abortion. As a result, there are large evidence gaps in the documentation of abortion incidence and abortion-related morbidity. One major problem in carrying out research on abortion is the generally high level of underreporting. For example, with surveys of women, a high proportion of respondents will not report their abortion experience because of the strong stigma against abortion. In addition, data on abortion from such surveys are likely to be nonrepresentative of all women, because underreporting typically varies according to women's characteristics. As a result, measures of abortion incidence, prevalence and morbidity from face-to-face surveys of women are likely to be both underreported and biased.

Surveys of providers are also problematic for a number of reasons. Such surveys may not be possible in countries where the procedure is illegal for obvious reasons (fear of prosecution), and even if they are conducted, underreporting will likely be high. Where abortion is legal under broad indications, the numbers of official abortions may be low because private-sector providers may not be required to report to government statistical bodies; because public stigma affects providers' willingness to openly acknowledge that they perform abortions; because providers who do not meet all requirements to do the procedure may be reluctant to participate in surveys; and because others may not want to have this source of income recognized by authorities.

In summary, the quality of data on abortion incidence or prevalence is problematic both when women and providers serve as data sources, regardless of the legal status of abortion. Thus, data-quality issues persist in countries where abortion is legally permitted under broad criteria, as well as in countries where it is permitted only under very restricted circumstances, such as to save the life of the pregnant woman. In the case of morbidity, data collected from facilities that provide postabortion care can be of reasonably high completeness and quality. These data are valuable in documenting the health consequences of unsafe abortion and the medical care provided, but they do not represent morbidity from abortion among women who suffer complications but do not obtain treatment at a facility.

The objective of the following chapters is to contribute to addressing these data-quality issues by improving research on the measurement of abortion incidence and abortion-related morbidity. To do so, they provide overviews of existing methods of and approaches to estimating abortion incidence and morbidity. The volume supplies detailed descriptions and examples of key methods. Its goal is to provide a clear understanding of the relative merits of available study designs to quantify abortion incidence and abortion-related morbidity. Information on methodologies will greatly assist researchers worldwide in carrying out studies on these topics, particularly in settings where abortion is legally restricted.

This volume is primarily based on papers presented at a seminar titled Measurement of Abortion Incidence, Abortion-Related Morbidity and Mortality, which took place in Paris, France, in November of 2007. The seminar was convened by the International Union for the Scientific Study of Population's (IUSSP) Scientific Panel on Abortion, in collaboration with the Centre Population et Développement (CEPED) and the Centre de Recherche et de Documentation sur l'Amérique Latine (CREDAL). The goal of the meeting was to stimulate and advance research on the measurement of abortion incidence and its morbidity by bringing together researchers who had developed and applied different methodologies and approaches. Key papers from the seminar were selected to be revised for inclusion in the report. In addition, a few chapters were added on notable methods and topics that were not covered by the papers presented at the seminar.

The following chapters present a comprehensive appraisal of the state of abortion estimation methodology today. Many estimation approaches of both incidence and morbidity have been developed for use in contexts where abortion is legally restricted, some are used mainly where abortion is legally permitted under broad circumstances, and some are relevant in both contexts. As such, the volume is relevant for research in a wide range of contexts in

both developed and developing countries. Wherever possible, the chapters provide a way to validate the approach in question to assess how well it works to accurately quantify abortions or their morbidity.

Methods measuring the incidence of induced abortion generally fit into two categories. In the first, *direct methods,* women are directly interviewed about their abortion experience through surveys that can use community-based, convenience or random samples. The degree of underreporting in a direct survey will vary by country and is associated with each society's cultural and religious framing of abortion. Societies that are tolerant of abortion will have less underreporting, and the stronger the stigma surrounding abortion, the more likely women will not report their abortions in a direct, personal interview.

Because of the sensitivity of the topic and the tendency for abortion to be heavily underreported, women who self-report an abortion tend be a highly selective group, which automatically introduces bias into the resulting measures of abortion incidence, prevalence or morbidity. The volume provides information on approaches to remove some of that bias through approaches that shield women's identities from interviewers or that use qualitative techniques to build rapport to lessen reluctance to report an abortion. One of the greatest strengths of direct methods is that they can obtain information on women's characteristics (such as demographic, social and economic characteristics) that help to better understand the barriers women face in accessing safe abortion and treatment for unsafe abortions. Direct surveys also yield invaluable details about the process of seeking an abortion and whether women were practicing contraception (and, if so, which method they were using) when they conceived the pregnancy that ended in an abortion.

Approaches in the second major category, *indirect methods,* are often most useful when measuring abortion incidence and related morbidity in settings where abortion is highly stigmatized, and thus illegal and unsafe. These methods rely on retrospective hospital records, prospective health facility data, and retrospective surveys of health professionals and facilities. Other indirect methods interview third parties about others' abortions, and several integrate elements from both direct and indirect approaches to assure the most complete—and most accurate—reporting possible.

This volume presents many examples of direct and indirect methods of estimating abortion. It is divided into two main sections. The first section (Chapters 1 through 9) covers fundamental methods and approaches to estimating abortion incidence, including those that have been used for decades as well as new and less well-known methods. The second section (Chapters 10 through 14) covers methodologies for estimating and examining morbidity resulting from unsafe abortion, a research area that is somewhat less developed. All chapters provide detailed descriptions and discussions of how the methodologies have been applied and indicate their strengths and limitations. We anticipate that this volume will be helpful to researchers and students conducting abortion studies, and to advocates, program managers, service providers and others who use the studies' results for policy change, program development and public health interventions. Below we give a brief summary of the material covered in each chapter.

CHAPTER 1. *Generating National Unsafe Abortion Estimates: Challenges and Choices* highlights the need for more national-level estimates of unsafe abortion in countries that legally restrict the procedure. The authors stress the importance of measuring the magnitude of unsafe abortion at the country level to inform national strategies to improve women's reproductive health. Country-level data on the scope of unsafe abortion are not only essential for local advocacy and intervention but are useful for building an accurate knowledge base on which to design and implement solutions. The chapter describes the methodology used by the World Health Organization (WHO) to make regional and global estimates of unsafe abortion and outlines how country-level assessments of unsafe abortion can be developed by drawing on existing data. The chapter identifies regions where country-level data are most needed, underlines the importance of using existing and often untapped data sources, and draws attention to lesser-known aspects of incidence research.

CHAPTER 2. *Measuring the Incidence of Abortion in Countries with Liberal Laws* reviews and discusses data-quality issues affecting a range of sources of data on legal abortion. These include central government agencies, surveys of abortion providers, surveys of women, insurance reimbursement reports and hospital statistics. The chapter describes in detail the data collection systems of eight countries (Australia, Canada, China, Finland, India, the Russian Federation, the United States and Vietnam). It provides examples of existing data collection efforts for countries whose abortion laws have been newly liberalized and whose systems are still being put into place, and where improvements in established data collection procedures are needed. The chapter details the importance of using population data to convert numbers of abortions into uniform measures of annual rates (per 1,000 women of reproductive age) and ratios (per 100 live births) for

cross-country and regional comparisons. It also discusses issues that remain to be solved to achieve more complete reporting of abortion in settings where the procedure is legal and available.

CHAPTER 3. *Three Approaches to Improving the Use of Face-to-Face Interviews to Measure Abortion* presents modifications to standard approaches toward interviewing women about abortion. Two incorporate a qualitative data component. The first, a protocol known as the Abortion Frequency Survey, was applied and validated in Matlab, Bangladesh. It used a semistructured questionnaire with both open- and closed-ended questions to elicit better reporting of abortions by taking into account the underlying cultural context of abortion. The second, a two-day, "narrative" survey technique was applied in Madhya Pradesh, India. That technique started out with qualitative questions to build rapport with women before asking them to report their abortion experiences as part of the broader story of their lives. The third approach involved the addition of a special abortion module to standard Reproductive Health Surveys conducted in Eastern Europe. In these former communist countries, stigma against abortion has been relatively weak and, as a result, women rarely underreport their abortions. Government reporting systems, however, have increasingly become more inefficient and incomplete, so in this environment, direct questioning of women using a specialized module is assumed to produce more complete and more reliable measures of abortion incidence. The authors also point out that while the true abortion rate is unknown, different survey designs affect completeness within the same country; as a result, there is need for further work to improve measurement of incidence in Eastern Europe.

CHAPTER 4. *Examples of Model-Based Approaches to Estimating Abortion* introduces the attractive concept of not having to gather new data on the highly sensitive topic of abortion. Instead, its incidence is indirectly deduced through existing relationships with other fertility determinants. The chapter is divided into two parts. Part I, The Residual Technique, discusses how Bongaarts's model of the main proximate determinants of fertility—for which standard reproductive health surveys readily supply three of the four main determinants—can be rearranged to yield an abortion index, which is then converted into abortion rates. The residual technique is applied with data for Matlab, Bangladesh, and its validity is assessed through comparison with abortion data collected from a direct Abortion Frequency Survey and results from an application of the indirect Abortion Incidence Complications Method (AICM).

Part II, A Regression Equation Approach to the Estimation of Abortion Rates, is premised on the very high correlation between modern contraceptive use and abortion in 44 countries (most of which are developed countries). From this observation, the author assumes that widely available contraception and fertility information can serve as input data in a regression equation to predict total abortion rates (TARs). TARs from a first equation using both traditional and modern method use are presented for 34 countries, and regression-derived TARs for broad international regions are compared with TARs estimated by the WHO and the Guttmacher Institute. Part II also provides results of a modified regression equation using modern contraceptive use only to predict abortion.

CHAPTER 5. *Examples of Methods to Address Underreporting of Induced Abortion: Preceding Birth Technique and Randomized Response Technique* evaluates two indirect methods that specifically address underreporting of abortion in contexts where abortion is illegal or access is highly restricted. The Preceding Birth Technique (PBT) was employed in a study in Ghana and the Randomized Response Technique (RRT) was used in a study in Mexico. Applying the PBT to abortion research involves adapting a method that was used to collect stigma-free information on previous births to instead collect data on previous abortions. With RRT, women (who can be semi-literate or illiterate) are asked to privately respond yes or no to one of two questions that the interviewer is unaware of, on a form that is separate from other questions. One question has a known probability and the other asks the sensitive question about abortion. The prevalence of abortion can then be calculated from the responses. These two methods collect only data on whether women have ever had an abortion (prevalence) and, given the data collection design, cannot identify the characteristics of such women.

CHAPTER 6. *The Abortion Incidence Complications Method: A Quantitative Technique* describes this indirect approach that builds on the number of women treated in health facilities for abortion complications to estimate the total number of induced abortions. The AICM first yields data on numbers and rates of women receiving treatment for complications of induced abortion, either through national hospital discharge data or a nationally representative Health Facilities Survey. Then, respondents to a Health Professionals Survey are asked three sets of questions that are used to calculate a multiplier by which to inflate the morbidity data to take into account those women who do not develop complications or who do not get formal treatment. (These questions ask about the distribution of abortions by type/provider, the probability of complications

with each respective type/provider, and women's likelihood of getting treatment.) The AICM provides estimates of the total annual number of women obtaining induced abortions and the annual rate of abortion, nationally and by region. The method is especially useful in countries where abortion is highly restricted by law or where abortion may be permitted under broad criteria but its practice is unsafe. The chapter assesses applications of the AICM over the past 20 years in diverse settings.

CHAPTER 7. *Measuring Abortion with the Anonymous Third Party Reporting Method* also reports on a way of measuring abortion where the procedure is illegal, not openly tolerated and socially stigmatized, but in a country context where women are knowledgeable about and willing to report on the abortion experience of their close friends/relatives. In this innovative method, neither a woman who has had an abortion nor a provider who has supplied one is asked to disclose socially sanctioned information about themselves. Instead, individuals are asked to report on the abortions of their *confidants* (i.e., those of the women who confide in the respondents). The chapter describes an application in Burkina Faso of this method to obtain more complete reporting by asking about the abortions of others. Qualitative interviews showed that, in this setting, women who are unwilling to talk about their own abortions were more forthcoming about abortions obtained by women in their social network. The methodology converts information on confidants' abortions into measures of abortion prevalence.

CHAPTER 8. *The Sealed Envelope Method of Estimating Induced Abortion: How Much of an Improvement?* reviews another method that is useful in areas where strong stigma against abortion means women are highly unlikely to report their abortions in a face-to-face interview. In the sealed envelope method (SEM), a short, private self-administered survey is added on to and linked with personal interviews conducted as part of a community-based survey. The add-on questionnaire is self-administered in private by literate women and then placed in a sealed envelope, thus assuring complete confidentiality. The chapter presents findings on abortion prevalence from an application of the SEM in the Philippines. Because the data from the face-to-face interviews and the self-administered interviews are linked, the method reveals the characteristics of individual women who are more likely to report an abortion with each approach. To assess which method captures more abortions among the same women, the authors compare abortion prevalence rates from the two data collection approaches. Validation of the method's results requires that they be assessed against other estimates of abortion. Fortunately, the widely regarded quantitative technique, the AICM, was applied in the Philippines just a few years earlier; unfortunately, the SEM yields abortion prevalence, whereas the AICM yields abortion rates. Thus, to make the results closely comparable and enable validation, the authors propose a novel method of converting abortion prevalence into abortion rates.

CHAPTER 9. *Data Triangulation: Using Multiple Methods to Estimate and Validate Abortion Incidence and Prevalence* builds further on the validation efforts just mentioned. The strategy of data triangulation emphasizes the importance of using multiple estimation methodologies— qualitative, quantitative, direct and indirect—to enhance confidence in the final results. A triangulation strategy is useful in all regions of the world and in all legal settings because abortions are universally underreported. Triangulation overcomes some of each individual method's limitations by using two or more research techniques and cross-checking the results for consistency. The strategy helps researchers determine which methodologies yield the most accurate estimates in a given setting or population. The chapter summarizes findings from several studies that incorporated multiple estimation techniques, including studies conducted in Argentina, Bangladesh, Mexico and the United States.

CHAPTER 10. *Prospective Approach to Measuring Abortion-Related Morbidity: Individual-Level Data on Postabortion Patients* starts the second part of the report, which is devoted to methods of estimating abortion morbidity. The estimation techniques discussed so far have all involved collecting retrospective data on past events. In this chapter, the author describes the evolution of an early WHO methodology of collecting prospective data on women admitted for treatment, and using their symptoms and contraceptive-use information to label the obstetric event as a miscarriage or a probable, likely or certain induced abortion. In the Prospective Morbidity Method (PMM), the WHO methodology is refined to measure the extent and severity of postabortion morbidity based on symptoms. It involves collecting information for all women receiving postabortion services (for any pregnancy loss, spontaneous or induced) at a representative sample of facilities over a period of a few weeks, and using this information to classify patients according to the severity of their symptoms as high, moderate or low. In settings where abortion is legal or carries relatively little stigma, postabortion patients can be interviewed themselves about their

symptoms. The method also provides details of the medical treatments and procedures provided to postabortion patients, which are useful for planning resources. After revisions to the original methodology were made in the late 1990s, the PMM no longer aims to separate out or distinguish between induced abortions and spontaneous pregnancy losses. The author describes applications of the PMM in Cambodia, Ethiopia, Kenya and South Africa, and a pilot test to assess its feasibility using data on treatment rather than symptoms in Nepal.

CHAPTER 11. *Use of Health System Data to Study Morbidity Related to Pregnancy Loss* focuses on the ready availability of health system data to gather information on in-patient hospitalizations for pregnancy loss at the national and state levels in the case study of Mexico. The authors use ICD-10 codes diagnosing "pregnancy with abortive outcome" for a five-year period from Mexico's four main public-sector health systems to calculate annual pregnancy-loss hospitalization rates for the country as a whole and for each state. These rates include losses from abnormal pregnancies (including those from ectopic and molar pregnancies) as well as losses due to spontaneous and induced abortions. The ICD-10 codes also allow for an assessment of severe complications from all types of pregnancy losses. The author compares hospitalization rates across states and also over time to detect trends. Assuming current patterns remain unchanged, the authors project hospitalization rates for the next 10 years to estimate future demand on public health institutions for needed care following pregnancies with abortive outcomes.

CHAPTER 12. *Quantitative Measures of Self-Reported Data on Abortion Morbidity: A Case Study in Madhya Pradesh, India* tries to standardize measures of self-reported morbidity based on results from the qualitative-quantitative survey approach described in Chapter 3. The data collected were used to develop three measures of registering the severity of abortion-related morbidity: by physical symptoms from an abortion attempt; by the time spent on bed rest to recover from those symptoms; and by a combined variable that incorporates elements of both. The incidence and severity of morbidity varied by how it was measured, suggesting that no single measure accurately captures the subjective notion of severity, and that a standardized, combined-measure approach would work best.

CHAPTER 13. *Self-Reported Data on Abortion Morbidity: Using Qualitative Techniques with Community-Based Samples* also reports on results of self-reported morbidity, but this time from community-based, qualitative surveys only. This research was conducted in Uganda and Guatemala, both countries where abortion is highly restricted and predominately unsafe. The Community Abortion Morbidity Study (CAMS) was administered among both community members and among providers (formal and informal) who treat complications from unsafe abortion. The studies used a qualitative approach that employed both focus group discussions and in-depth interviews. The chapter lays out the difficulties that arose while studying women's experiences of abortion morbidity where the restrictive law and culture made participants highly unlikely to mention any experiences of abortion, even those of third parties.

CHAPTER 14. *Misoprostol Use and Its Impact on Measuring Abortion Incidence and Morbidity* addresses the increasing importance of misoprostol (Cytotec) as a method of self-inducing abortion in highly restricted settings, and the challenges the drug presents in quantifying abortion morbidity and related calculations of incidence. For example, the drug's relatively mild complications have likely lessened the severity of the health consequences of unsafe abortion, but its incorrect and underinformed use may have also increased the proportion of women who present at facilities. The chapter presents case studies from Latin America where misoprostol-induced abortions are believed to be especially common. The authors report on various ways to assess its use and access, including through national pharmacy sales, direct interviews with women and pharmacists, and pharmacy-based "mystery client" scenarios in which researchers pose as clients to see whether and how vendors dispense the drug. The authors warn about the potential pitfalls of disseminating findings about extensive misoprostol use, which could cause a backlash that tightens restrictions on the drug.

In sum, the chapters described above present a snapshot of the current state of abortion research. Accurate measurement of abortion incidence is essential for a broad array of reasons: From a demographic perspective, abortion is a key component of fertility control that is inextricably tied to unintended pregnancy; from the perspective of gender imbalance, abortion may influence sex ratios if sex-selective abortion is common in a given society; and from a service-provision perspective, abortion is an indicator of unmet need for contraception and for improved contraceptive services. In addition, accurate measurement of abortion incidence (safe and unsafe) is needed to assess the impact of changes in abortion laws and regulations.

It is equally important to have accurate measures of the extent of unsafe abortion and its consequences, which continue to lead to morbidity and mortality worldwide. Results from the rigorous study of unsafe abortion need to be widely disseminated. Morbidity from unsafe abortion has a negative impact on women and their families; puts strain on the resources of public health systems; and results in the loss of economic productivity. Moreover, information on abortion morbidity is essential for estimating the costs of treating abortion complications in health care systems.

Despite the difficulty of measuring abortion incidence and morbidity, it is crucial to continue developing new techniques and advancing existing methodologies. To that end, the volume presents a set of methods to improve the measurement and analysis of abortion incidence in any country, and of abortion morbidity in settings where the procedure is predominantly unsafe. We hope it will be a significant contribution to this field of study and serve as a useful reference in the future.

CHAPTER 1

Generating National Unsafe Abortion Estimates: Challenges and Choices

Elisabeth Ahman and Iqbal H. Shah

Unsafe abortions are of major public health significance. As far back as 40 years ago, in 1967, the World Health Assembly recognized that unsafe abortions constituted a serious public health problem in many countries (World Health Organization [WHO] 1967). However, it was the 1987 Safe Motherhood Conference, held in Nairobi, which played a pivotal role in the recognition of unsafe abortion as a major health hazard and an important contributor to maternal mortality and morbidity (Cohen 1987). Since then, several global conferences such as the 1994 International Conference on Population and Development stressed the prevention of unsafe abortion as critical to improving maternal health and reducing maternal mortality (United Nations 1995; United Nations General Assembly 1999). Moreover, addressing unsafe abortion is critical to realizing the 2000 Millennium Development Goal of improving maternal health.

It is well known that induced abortion is stigmatized and that women are reluctant to report having had one. *Unsafe* induced abortions are especially difficult to measure and, in general, their occurrence can only be estimated indirectly. Underreporting of all procedures occurs even where abortion is legal on request or under broad conditions; unsafe abortions in particular may not be reported at all or be recorded as spontaneous abortions (miscarriages). Therefore, obtaining reliable information on the incidence of unsafe abortion poses major challenges.

WHO has estimated incidence globally and by region since the early 1990s to document the public health problem of unsafe abortion. These estimates are built from country-specific information; however, aggregated estimates at the regional and global level are more robust and can potentially offset individual country-level underestimation or error. Global and regional unsafe abortion estimates have been published by WHO for the years 1993, 1996, 2000 and 2003 (WHO 1994; WHO 1998; WHO 2004; WHO 2007). These likely conservative estimates suggest that, worldwide, roughly 19–20 million unsafe abortions are performed each year. Indeed, expanded access to data and improvements in research techniques have shown that some early unsafe abortion estimates by WHO, particularly those for Sub-Saharan Africa, were underestimates.

The primary objective of this chapter is to encourage and facilitate researchers in finding ways to make and publish national-level estimates of unsafe abortion where such estimates are currently unavailable. Knowing the magnitude of unsafe abortion in a given country facilitates an informed discussion on the abortion issue and on improving women's reproductive health there. The country-level incidence of unsafe abortion can be employed for local advocacy and interventions, and would better establish the scope of the problem at regional and global levels. We support such endeavors by drawing attention to underused data and relevant research to approximate national estimates of unsafe abortion. Currently, there are fewer than 20 published country-level estimates; however, data of acceptable quality exist that can be evaluated and analyzed to produce more appraisals of individual countries. A well thought-out, critical assessment of the magnitude of unsafe abortion at the country level is more useful than mere recognition of the problem.

This chapter builds on WHO methodology and experience in making regional and global estimates over the last 15 years. It also reflects an extensive review of the literature and approaches used to collect and present information on the incidence of unsafe abortion. We first briefly explain WHO's experience in the estimation of unsafe abortion. Then we outline how country-level assessments of unsafe abortion can be developed by drawing on existing methodologies, so researchers can make use of work that has already been done. Finally, we suggest that appropriate population data accompany all estimates of unsafe abortion incidence to allow calculations of rates or ratios, so estimates are strictly comparable. We also identify regions with little usable data or where data are outdated. This chapter thus covers ways of facilitating and improving the national measurement of the incidence of unsafe abortion and of narrowing existing information gaps.

Defining Unsafe Abortion

Induced abortions are performed both within the law and outside it. However, the risk to a woman's health will always depend on the circumstances of the procedure and the medical skills of the abortion provider. In some countries, the lack of resources to invest in medical infra-

structure and inadequate medical skills among providers may mean that even abortions that meet the legal and medical requirements of a country carry a higher degree of risk than those performed in high-resource settings.

Induced abortion is a very safe procedure when performed by qualified persons using correct techniques in sanitary conditions and with proper postabortion care (Gold 1990). WHO defines unsafe abortion as a procedure for terminating an unintended pregnancy that is carried out either by persons lacking the necessary skills or in an environment that does not conform to minimal medical standards, or both (WHO 1992). Induced abortions that are done outside the law are frequently performed by unqualified and unskilled providers, or are self-induced; such abortions often take place in unhygienic conditions and involve the use of dangerous methods or the incorrect administration of medications.

However, even when clandestine abortions are performed by a medical practitioner, such procedures are conducted outside a recognized facility and thus generally carry additional health risks: Medical back-up is not immediately available in an emergency, the woman may not receive appropriate postabortion care, and if complications develop, she may hesitate to seek care. Procedures carried out by medical personnel with variable skills in somewhat unsafe settings are therefore counted as unsafe abortions. The incidence of unsafe abortion and its relative health risk thus differ by a given country's provider skills, resources invested in the health system (including the abortion methods used) and de facto application of the law (Berer 2004). Thus, induced abortions occur on a sliding multidimensional scale of resources, skills and legality. Operationally, estimates of unsafe abortion are intended to capture abortions that carry greater health risks than those carried out for officially accepted reasons under the laws of the country concerned. Abortions that are performed within the parameters of the law and officially accounted for are addressed elsewhere (Sedgh et al. 2007).

Estimating Incidence: The WHO Approach and Experience

Here we briefly summarize the approach that WHO uses to calculate global and regional estimates of the incidence of unsafe abortion,* which are aggregated from country-level information and estimates. First, an extensive literature search is performed to take into account any published country-specific estimates. All known studies reporting subnational or national data are included in a database along with critical information related to the reported data and the corresponding methodology and coverage of each study. When no country-level estimate is published, we extrapolate from national or subnational abortion data using the regional and global estimation process. Evaluations of available data for a country also consider a wide range of abortion research to formulate appropriate assumptions (WHO 2007) and make the adjustments needed to approximate the most probable magnitude of unsafe abortions for a given country.

The abortion figures are assessed together with the legal grounds for abortion, the total fertility rate, overall and modern contraceptive prevalence, and any other available contextual national information (such as a recent change in the law). To arrive at regional and global estimates of unsafe abortion, we aggregate national rates that are calculated for the data year and are projected forward to yield the number of unsafe abortions in a given reference year. We discuss three major approaches to estimating national-level incidence that rely on national or subnational data: adjusting by applying *multipliers* to hospitalized abortion cases; correcting for *underreporting* in surveys; and applying a ratio of *urban to rural abortions* to account for the lack of data from rural areas, when applicable.

Currently, the two main sources of data are health service statistics and a variety of types of surveys, although additional promising approaches use other sources of data (Johnston and Hill 1996; Lara et al. 2004; Westoff 2008). Corrections of such raw data are indispensable. Hospitalization numbers, for example, show only complications from unsafe abortion that reach health institutions for treatment, leaving out both women who are reluctant to seek needed help and those with only minor complications (Singh and Wulf 1994). Even in countries where the procedure is legal, in surveys women underreport their abortion experiences (Fu et al. 1998; Jones and Kost 2007), so further adjustments are needed. Obviously, country assessments that are needed to make global estimates and that rely on adjustments applied in other countries (instead of on research that is specific to unsafe abortion in that country) are somewhat less precise than country-level published national estimates, which best serve the needs for interventions and global estimation. (For further information, see WHO 2007.)

*A detailed description of the methodology is found in Chapter 6 and Annex 1 of *Unsafe Abortion. Global and Regional Estimates of the Incidence* of *Unsafe Abortion and Associated Mortality in 2003,* fifth edition, which can be requested from WHO or downloaded from http://www.who.int/reproductivehealth/publications/unsafe_abortion/9789241596121/en/index.html.

National Estimates: The Basis for Strategic Planning

We consider it essential to expand research on country-by-country estimates of unsafe abortion incidence. While this goal may not be immediately feasible, it is often possible to assess existing data and extrapolate them to the national level while pursuing more precise estimates in the long term. The ultimate goal, at any one time, is to have the best possible country-level estimates of the incidence of unsafe abortion available in the public domain.

A publically available national estimate of the incidence of unsafe abortion increases the local knowledge base, feeds into strategic planning, and informs decision making and program implementation. National-level estimates can be an especially powerful advocacy tool. They are also essential to providing a baseline from which to measure changes over time or the effects of specific interventions. The improved national-level data provide the added bonus of strengthening the regional and global estimates that they provide the basis for.

Whereas subnational small-scale studies may be of interest, investigators should consider assumptions that can be generalized and, if possible, extrapolate their data to the national level. On the other hand, unsafe abortion estimates should not be done at the expense of quality; publishing unsubstantiated figures of unsafe abortion may be counterproductive. Researchers have the responsibility to fully explain their findings. Only well-argued and reliable results can help influence opinion, policy and decision makers. An estimate of unsafe abortion incidence in a country can potentially mobilize support for increased resources, including for contraceptive information and services, to help women avoid unintended pregnancy and safeguard their reproductive health.

Although fewer than 20 national-level estimates, some done a decade ago or earlier, were available to develop WHO's 2003 estimates, we were able to identify heretofore unused relevant data at the national level for another 30 countries. In some instances, more recent data were available than the widely accepted estimates, which provided opportunities for analyzing trends over time. More possibilities exist for assessing the unsafe abortion situation than is generally perceived to be the case. We surmise that as many as 80% of the world's unsafe abortions can be measured from available national data, taking into account official national estimates and assessments from currently unadjusted national data (Table 1). Making the necessary, well-argued adjustments to existing abortion data could vastly expand the number of publishable national estimates. Better still, complementary research into appropriate adjustment factors could be performed, which would make those estimates more reliable.

Assessing National Incidence by Filling in the Gaps

This section briefly reviews issues that arise from assessing the incidence of unsafe abortion at the national level. Our analysis draws on the numerous studies that were reviewed to estimate the global and regional incidence of unsafe abortion as recently as 2007 (and earlier). The recommendations reflect our disappointment at finding imprecise terminology, a too-narrow perspective that resulted in omitted data and a failure to identify data that are currently available. In the following section, we suggest ways for researchers to generate more national-level estimates of unsafe abortion. We organize the discussion in 10 interrelated (but not exhaustive) points under the following five categories:

- underused sources of national data (points 1–2) and reliance on existing adjustment factors;
- new research into correction factors to adjust data from surveys, hospitals and urban areas only (points 3–5);
- need for appropriate population data to accompany unsafe abortion data (points 6–7);
- identification of countries and regions where data are scarce or no longer recent enough to be reliable (points 8–9); and
- the need for unambiguous terminology to improve estimation efforts (point 10).

Underused Existing National Data

1. Unadjusted, reliable country-level data

Unsafe abortion incidence cannot generally be measured directly. The appropriate and ideal method to arrive at a national estimate is through a two-pronged approach of data collection matched by complementary research to determine the adjustments needed to extrapolate to the national level. Data collection efforts that, for whatever reason, omit the extrapolation research component miss an opportunity to provide a national-level estimate (Gebreselassie et al. 2004; Jewkes et al. 2005; Warakamin et al. 2004). Well-informed local researchers can generate a national-level estimate by extrapolating from data that have already been collected and by relying on research to calculate appropriate adjustments (see points 3–5 below). Alternatively, reasonable correction factors from another country with similar basic parameters can be used to generate an approximate national estimate or provide a probable range of estimates.

2. Underused hospital and raw survey data

Identifying and using already existing data is very cost-effective. Data that are relatively easy to access but are

currently underused for abortion estimation purposes include Ministry of Health data—published or posted on Web sites—of national hospital abortion admissions and birth data. These can be found in countries with good hospital statistics, mainly in Latin America and Asia (Dirección Nacional de Políticas de la Salud Panamá 2005; Caja Costarricense de Seguro Social 2003; Ministerio de Salud y Deportes [Bolivia] 2006; Ministry of Health [Brazil] 2006; Rostagnol 2007; Faneite 1997; Health Information Directorate [Bahrain] 2003; Project Inco-MED-TAHINA 2005). The ratio of admitted abortion patients (adjusted to exclude spontaneous abortions) to hospital-based births can provide the basis for applying the widely used technique of estimating unsafe abortion through data on hospital admissions for treatment of abortion complications (Singh and Wulf 1994).

Relying on existing data from public sources would presumably generate less complete information than would actively collecting and scrutinizing hospital admission records; however, it will be a close approximation. Research resources could then be directed toward obtaining a country-specific multiplier to generate a reliable national-level estimate (see point 3 below). In addition, researchers can identify other public sources of data that are only available locally (McNaughton et al. 2002). For some less-researched countries, published or Web-posted data are accessible only to researchers familiar with the local situation and language.

The use of existing national or subnational survey data would free up resources to focus on calculating multipliers to adjust for underreporting (see point 4 below). Alternatively, one could combine existing national survey data with external correction factors to adjust for underreporting (Islam and Damena 2004; Oliveras 2003). The different approaches yield estimates of varying precision; however, authors should not be too fearful of publishing a well-discussed range of possible estimates, as long as the estimates clearly point at the overall magnitude of unsafe abortion.

National researchers will have the best chance of identifying other local data sources that external researchers may be unaware of; they should therefore scrutinize every option to find and effectively use all available survey or hospital data.

Research to Generate Adjustment Factors to Apply to Estimates from Hospital, Survey or Area-of Residence (Urban or Rural) Data

3. Adjustments for unsafe abortions not captured in hospital data

The most well-known way to estimate unsafe abortion in a country is to start with national estimates of hospitalized abortion cases (see point 2) (Singh and Wulf 1994). However, hospital data show just the tip of the iceberg, and only a minority of women who have had an unsafe abortion will need, decide to seek and obtain hospital care. Through a survey of knowledgeable health professionals, a multiplier is established to account for women who had an induced abortion but did not obtain hospital care. Currently, multipliers from 2 to 7 are applied to the rate of hospitalized abortion cases in different countries (Singh and Wulf 1994; Huntington 1997; Singh et al. 1997; Singh et al. 2005; Singh et al. 2006; Ferrando 2002; Sathar et al. 2007; Juarez et al. 2005). The "safer" the abortion, the higher the multiplier. Studies using this methodology regularly report both the input data and a multiplier (adjustment factor) to yield reliable national estimates. Expanding the "pool" of existing studies that have estimated adjustment factors to apply to national hospital abortion data would help produce more low-cost estimates of the incidence of unsafe abortion in individual countries, especially resource-poor ones.

To further the use of hospital data, which are relatively easy to come by from local, regional and national facilities, innovative research approaches are needed to determine the hospitalization rate among women who have unsafe abortions. Surveys that capture the methods women use to induce abortion, the morbidity caused by unsafe abortion and women's care-seeking behavior can also be used to help generate multipliers and validate the results of the Health Professionals Surveys mentioned above (Centers for Disease Control and Prevention [CDC] and ORC Macro 2003). Another possibility is a "reverse sisterhood method" whereby women hospitalized for complications of unsafe abortion are interviewed to estimate the number of "sisters" or "close friends" who had an unsafe abortion and did not develop complications requiring hospital care. However, we should always keep in mind that corrections to hospital data are as important as the data themselves, in some ways more so, as the final estimates are particularly dependent on the multiplier that is applied to the data.

There are pitfalls in using the number of hospitalized abortion cases, however, since these numbers have to be carefully assessed. For example, both public and private hospitals need be included in national-level estimates. If that is not possible, we need to take into account individual hospitals' share of all abortions and/or distribution of births to correctly extrapolate to the national population (see point 6 below) (Kenya Central Bureau of Statistics 2004). Collecting national data on hospitalized abortion cases is not a task easily undertaken and is only the first step in estimating abortion incidence (Jeppsson et al. 1999).

4. Correction factors for underreporting in surveys
Even "good" data may need to be corrected (Walker et al. 2007), since abortions in general—and unsafe abortions in particular—are well known to be underreported in population-based surveys due to the sensitivity of the issue. Many women simply do not report having had an induced abortion or prefer to report induced abortions as "miscarriages." Further study on why women do not report their abortions should focus on personal circumstances, prevailing attitudes toward abortion and the extent to which restrictive laws are applied.

Surveys rarely achieve a complete count of all abortions or appropriately adjust for underreporting, so an adjustment factor is always needed. The available "pool" of adjustment factors needs to be expanded so they can be used in similar settings where surveys have not been conducted. There is an urgent need for research into underreporting *per se,* so population-based surveys can uncover the *true* incidence of unsafe abortion (Islam et al. 2004; Oliveras 2003). The extent of underreporting depends largely on the survey method or approach used. Studies to identify how survey approaches influence underreporting in different settings may provide insights into the circumstances and causes of underreporting.

The results of these studies would be useful for correcting existing and future survey data with an unknown level of underreporting. For example, a study conducted in Accra, Ghana, compared women's self-reports of abortion in a household survey with abortion data gathered as part of medical histories (Oliveras 2003). Self-reports of abortions, miscarriages and any pregnancy loss were always consistently higher in the medical histories than in the household surveys (by factors of 4.0, 2.6 and 3.0, respectively). These results suggest that women are highly sensitive toward reporting all forms of pregnancy loss in surveys. Interestingly enough, some induced abortions were only reported in the survey but not in the medical history; however, medical histories alone captured 95% of induced abortions.

Further investigation of the causes and extent of underreporting may consist of reinterviewing women, applying randomized response techniques to validate survey results, and using combinations of structured survey questionnaires and in-depth interviewing methods.

5. Extrapolation from subnational data (for example, from rural or urban areas)
When no national data are available, weighting data from rural and urban areas by the urban/rural population distribution provides a useful approach to measuring national-level estimates. However, when data are available from just *one* area of residence, we need to know the urban-to-rural ratio to estimate national-level incidence, albeit with less precision.

Because unsafe abortion rates are generally lower in rural than urban areas (Agyei et al. 1992; Katsivo 1993; Ismael and Damena 1996; Geelhoed et al. 2002; Asociación Demográfica Salvadoreña 2004; Ezimova et al. 2001), a known ratio of abortion incidence (for example, rural vs. urban) can allow for a countrywide estimate even when only a subnational incidence study is available (Ahiadeke 2001). When the rural/urban abortion incidence ratio for a given country is not known, researchers can use the ratio from similar settings or countries; however, more assumptions yield less precise estimates.

Knowing the magnitude of unsafe abortion in urban and rural areas of a country is crucial for planning the provision of postabortion care services and interventions. Some potentially complicating factors to consider in gauging the ratio of rural-to-urban unsafe abortions include the following:

- Women living in rural areas will seek care in urban hospitals: Will this inflate the ratio of hospitalized abortion patients to deliveries in urban areas, or are rural women as likely to go to urban hospitals for abortion care as for delivery care?
- Using the same methodology to generate estimates for both rural and urban settings may be particularly useful for calculating a national estimate. Sentinel studies, appropriately dispersed over the country (not only in the capital city), could be a cost-effective approach.
- Assessing the extent to which a subnational study is representative of the country as a whole is essential to generalizing or adjusting its results.

Abortion studies in countries where the procedure is highly restricted are often ad hoc and many factors must be considered in determining whether and how to generalize from the data. This is particularly true for countries of the Middle East.

Need for Appropriate Population and Age Data

6. Matched abortion and population data to calculate rates or ratios
We cannot emphasize enough that the abortion numbers and their corresponding rates and ratios must not only be correct, but be described unambiguously and put into meaningful context. To avoid misunderstandings, facilitate verification and assure comparability, abortion numbers should preferably be reported along with their appropriate population numbers *and* the corresponding rates and ratios. Valuable research may become ineffective if this is not done.

A study that reports only a national abortion *hospitalization* rate or ratio should explain the choice of the measure, which is done only exceptionally (Singh 2006).

Abortion hospitalization data should preferably be extrapolated to yield estimates of the national unsafe abortion incidence. Unless appropriate population numbers or extrapolated unsafe abortion numbers are also provided, the general reader can easily misinterpret low hospitalization rates to mean that few unsafe abortions take place (Gebreselassie et al. 2004; Jewkes et al. 2005; Warakamin et al. 2004; Dias et al. 2000).

Abortion hospitalization data are best presented as ratios (of hospital-based abortions to hospital-based births) or rates (abortion admissions per 1,000 women of reproductive age, usually aged 15–44 in the hospital catchment area). Using the correct denominator is crucial. For example, if countrywide hospital abortion data cover public hospitals only, then the denominator for the ratio of hospitalized abortions to births should be the number of births occurring in public hospitals only, not all births in the country (public and private hospitals as well as home births). Alternatively, the data could be weighted by the distribution of births by public vs. private hospitals, which may be available from a country's Demographic and Health Survey, and further extrapolated to a national incidence. Of course, to maintain credibility, researchers who present national estimates of the number of unsafe abortions should fully explain how those estimates were calculated (Brookman-Amissah and Moyo 2004).

7. Age of the woman at the time of the abortion

Surveys often collect one piece of information that frequently remains unreported but is important for abortion research—the age of the woman at the time of her abortion. While knowing the woman's age is irrelevant to estimating recent abortion incidence, it is important for monitoring trends over time in the ages of women who seek unsafe abortion and in their reasons for doing so. Knowing the woman's age at the time of her abortion also provides valuable insight into how consequences may vary by age: For example, unsafe abortions among adolescents typically carry a much higher health risk than those among physically more mature women.

Women's average number of reproductive years—derived from the distribution of the women's *current* ages—and the average number of abortions can be used to convert lifetime abortion data into an annual average rate of abortion (Vignikin and Adjiwanou 2004), although rates calculated this way tend to underestimate current rates when abortion incidence is increasing. Once the measure is cumulated over all ages, it provides an estimate of the total abortion rate, which indicates the average number of abortions a woman is likely to have by the end of her reproductive lifetime, assuming that current age-specific abortion rates continue.

Scarcity of Data and Outdated Data

8. Lack of up-to-date data and estimates

Population-based surveys obtain different measures—for example, abortion prevalence or women's lifetime abortion experience, and may cover the past year only or the past three or five years. Clearly, to estimate current abortion incidence, researchers are encouraged to use the most recent data possible (within the past 1–5 years), data permitting.

Data for estimation purposes should be as recent as possible and definitely not date from before a major change in the overall reproductive health climate (i.e., in the abortion law or access to services). Furthermore, there is a need for ongoing, constantly updated research: For example, for the 2003 WHO estimates, incidence was estimated by projecting data from the last 10 years for the vast majority of women and abortions (see Table 1 at end of chapter); nevertheless, for approximately 10%, data were older. This illustrates the need for ongoing research. For example for many former Soviet republics, reports of women increasingly relying on abortion outside the formal system to save money or receive higher quality care has not stimulated any recent data collection, probably resulting in underestimation of incidence. Ongoing data collection efforts are important to generate trends in abortion over time and obtain parameters to project estimates. In general, better data are available now than were in the past, and more countries are covered. However, new data collection efforts must begin soon or future national and global estimates may be compromised.

9. Lack of data in some countries

For several countries, the magnitude of unsafe abortion is simply unknown or only limited subnational data are available; new research that yields good incidence data for these countries is needed to fill an important information gap, provide a baseline for monitoring and create the evidence base for advocacy. When such information is missing, estimation at the global level will necessarily depend on data from other countries with similar indicators or depend on a regional average (Table 1).

Good input data were available for the vast majority of women and births (see Table 1). However, many estimates depended on subnational data: For 34 countries, mostly smaller nations and those concentrated in Oceania, the Caribbean and the Middle East (Western Asia), no data could be identified. Filling this information gap poses a major research challenge.

Our global estimates are necessarily approximate and for countries that lack data, unsafe abortion is likely underestimated, which may explain some of the low rates and ratios in certain subregions (e.g., Western Asia).

We could not identify any usable estimate or data for 14 countries that have more than 50,000 live births annually. Furthermore, no data were available for several small countries in Africa (5), Asia (2), Latin America and the Caribbean (5), the Middle East (2), and for five island-states in Oceania.

Ambiguous Terminology

10. Need for clear language and precise terms

To improve unsafe abortion estimation techniques, researchers need to properly identify the exact type of abortion their data cover. For example, unless researchers specify otherwise, "abortion" data are assumed to cover both induced and spontaneous abortions. In that case, a proportion will have to be deducted to account for spontaneous abortions. Of course, a lack of clarity—i.e., whether spontaneous abortions are or are not included—would affect the accuracy of the incidence estimates.

In countries where abortion is severely legally restricted, researchers may be reluctant to use precise language; thus the unmodified term "abortion" likely refers to an induced abortion that is performed illegally. However, use of the term "abortion" alone diminishes the value of induced abortions estimates (Kambarami et al. 2000; Carvalho et al. 1996; Rattanavong et al. 2000). Authors should therefore, whenever possible, avoid referring only to "abortions" and instead specify whether the data refer to "induced abortions," "induced and spontaneous abortions" or find some other way of specifying the type of abortions that are included in their data.

Induced abortions are especially likely to be undercounted when detailed hospital studies count only women who *admit* to having had an *illegal* abortion or who present with obvious trauma to their reproductive organs; these women are often referred to as "certain" induced abortion cases. Wherever possible, such research should also account for women who are less willing to acknowledge having had an induced abortion or whose complications are less severe.

Conclusion

National estimates of the incidence of unsafe abortion are important for many reasons, including planning and implementing reproductive health programs and highlighting the severity of the public health problem caused by unsafe abortion. Estimates provide a tool for advocacy; the evidence base for improving contraceptive use and access to abortion services to the fullest extent allowable by law; and a rationale for changing the law (*de jure*) and its application (*de facto*).

Many public health issues remain unmeasured by country-specific data, and unsafe abortion is no exception. Its incidence has to be estimated using indirect techniques. Global incidence estimates that rely on published national estimates and available subnational data are only as good as their parts. We encourage researchers who study induced abortion to make realistic (that is, appropriately adjusted) national incidence estimates from new or already available data, or embark on specific studies to obtain the complementary information needed to calculate those adjustments. The ultimate goal is to have more national-level estimates of unsafe abortion and thus a more accurate knowledge base on which to design and implement solutions to the problem.

We hope our 10-point discussion will widen the use of existing data sources and further interest in less-known aspects of incidence research. Sources of data on unsafe abortion remain untapped in many countries and the potential for improving the estimation of unsafe abortion is immense. Some issues of key importance include measuring the level of underreporting in surveys, studying the implications of applying multipliers to hospital data, and developing new techniques to extrapolate subnational data to country-level estimates. We encourage reporting appropriate population data (to calculate rates and ratios) and presenting data on women's ages at the time of their abortions, even though data by age are not central to incidence studies.

Currently, there may be more data available on abortion incidence than ever before, and it is important to not lose momentum. Continued research is essential to expand the number of countries with usable data; gather the most up-to-date data; and extend data coverage to the national level. Ultimately, donors, international agencies and national family health organizations need to underwrite comprehensive and coordinated data collection efforts to estimate the incidence of unsafe abortion at the national level.

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TABLE 1. Percentage distribution of births, women and unsafe abortions used to estimate incidence for 2003, by time period of available data and source of data

Data availability (time period and source)	% of all births (N=132,724*)	% of all women aged 15–44 (N=1,454,484*)	% of all unsafe abortions (N=19,700*)
Time period of data			
Countries with no evidence of unsafe abortion	24	38	0
Countries where data are available for:			
2000 or later	39	33	57
1995–1999	23	18	29
<1995	10	8	12
No data available, so estimate from other country or regional average used	4	2	3
Total	100	100	100
Source of data			
Countries with no evidence of unsafe abortion	24	38	0
Countries with available data from:			
National community study, hospital data or national estimate	57	48	79
Subnational community study or hospital data	16	12	18
No data available, so estimate from other country or regional average used	4	2	3
Total	100	100	100

* In 000s.

CHAPTER 2

Measuring the Incidence of Abortion in Countries With Liberal Laws

Gilda Sedgh and Stanley Henshaw

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Induced abortion is closely linked to many aspects of women's health. Accurate information on its incidence is vital to understanding the level of unwanted pregnancy in a population and the role that abortion plays in maternal morbidity and mortality. In countries with highly restrictive abortion laws, it is extremely difficult to obtain reliable counts of the numbers of procedures performed. But in many countries with liberal laws, some sort of abortion data collection system or means of estimation is in place (Sedgh et al. 2007); however, the quality and completeness of the information generated by these systems vary greatly.

Fundamentally, not all countries' data collection systems have the same objective: Some are in place to identify all induced abortions that occur, regardless of who pays for the procedure or why it is obtained. In other countries, the data collection system identifies numbers of publicly funded abortions. Some collect information on the characteristics of women who obtain abortions and of the procedures they undergo. In still other countries, comprehensive abortion data collection efforts are not in place, and the best estimates come from administrative records of payments made or services provided.

The quality and completeness of abortion data also depend on whether abortion reporting is voluntary or required by law and, in countries where estimates come from payment records, whether reimbursements depend on the reporting of services rendered. In a small number of countries with liberal abortion laws, nationally representative surveys of women serve as the best or only basis for estimating abortion incidence. Survey estimates and official government statistics may both be available, and in these cases the findings from the two sources can be compared to assess the quality of each.

Abortion statistics also differ with respect to the group or agency responsible for data collection and the source of information used. Many reporting systems are led by a central government agency; in some countries, data collection occurs at the state or provincial level, and may or may not be compiled by a central government agency. In a few countries, private organizations have taken the lead in compiling abortion incidence data. The data collection forms also vary across settings: Most collect at least some information on the characteristics of women having abortions (e.g., age, marital status) and of the procedures themselves (e.g., gestational age, type of procedure performed).

The most recent comprehensive review of abortion incidence worldwide in countries with liberal abortion laws was made for 2003 and was limited to countries or territories with populations of at least one million (Sedgh et al. 2007). At that time, government abortion statistics were available from most of the 66 countries and territories meeting these criteria, and abortion statistics were considered complete (i.e., they included at least 80% of the true number of legal abortions) in 29 countries.

This chapter reviews and discusses quality issues for a range of sources of legal abortion counts and estimates—central government agencies; surveys of abortion providers; surveys of women; and insurance reimbursement reports and hospital statistics. We examine eight countries in some detail; three of these—China, India and Vietnam—account for a sizable proportion of all legal abortions performed worldwide (Sedgh et al. 2007). Some countries have more than one large-scale data collection effort in place; for two of these (United States and India), we review more than one system. No matter what type of data collection system is in place, numbers of abortions need to be converted to rates and ratios to yield comparable, uniform measures of incidence. (See Appendix A for a discussion of additional data requirements to estimate rates and ratios.)

Some of the issues we note are specific to the country described, but many are relevant to data collection systems in general. Our review is intended to inform data collection efforts worldwide, especially in countries where abortion laws have been newly liberalized and where systems are still being put into place and in countries working to improve established data collection procedures.

Reporting of Abortions to a Central Government Agency

Case Studies from Northern and Eastern Europe

In many countries, in Europe particularly, systems are in place for providers to report all procedures to a central government agency. The agency issues annual reports on the numbers of abortions performed and the characteristics of women who obtain them. These systems yield complete and accurate abortion information where the systems are fully implemented and enforced, and where all providers are required to report the abortions they perform. Such reporting is considered virtually complete in the Scandinavian countries, Scotland, and England and Wales. In some northern European countries, all abortions are provided under the countries' national health systems, which keep statistics on the services provided. In Scotland and England and Wales, each abortion must be approved by two physicians; this requirement may encourage complete recordkeeping.

The abortion data collection system for England and Wales is not reviewed here in full, but the data collection instrument, revised in 2002, is similar in content to the typical U.S. state form. The UK Department of Health strives to obtain a full report of all procedures by following up with practitioners who submit incomplete and incorrectly completed forms; using imputation to fill in missing data; and incorporating assumptions where imputation is not possible (UK Department of Health 2008).

Even in such settings, however, some abortion providers might not report the procedures they perform, even if they are legally required to do so, and others might report only some of the abortions they perform. The validation of abortion statistics using small samples is a helpful tool for estimating the true number of abortions in a country. Reporting systems appear to be reliable in several European countries, including Germany, Belgium and Italy. However, statistical validations have been conducted in very few countries; one of those few is Finland (see below).

For many years, France used an extremely detailed reporting form that permitted complex statistical analyses. For example, data were available to calculate the proportion of women in a given age-group who had a second abortion within a set number of years after a first. But the complexity of the form affected the completeness of reporting; recent simplification of the form reduced the time needed to fill it out and has encouraged more complete reporting.

It is often more difficult to achieve complete reporting from private facilities than from public clinics and hospitals. Medication abortions and early surgical procedures may also be underreported in some countries. Moreover, changes in reporting systems over time can affect the assessment of trends in abortion. In most of the former Soviet-bloc countries (see example of Russian Federation below), statistics are primarily comprised of abortions performed at public facilities, and the extent to which abortions performed at private facilities are reported is unknown.

Finland

In Finland, the law requires physicians performing abortions to fill out a form for each procedure and send it to the health authorities within four weeks (Gissler et al. 1996). This national register has been in place since 1950 and was updated significantly in 1977. According to a 1995 study that assessed completeness of the register by validating official reports against medical records in a sample of hospitals, coverage approached 99% (Gissler et al. 1996). The study used medical records as the gold standard, and the authors did not note any reasons why those records would be incomplete.

Reporting appeared to be poorer for some indications for abortion than for others, which biased the estimates of incidence by type of abortion. Specifically, only 78% of abortions for fetal abnormalities were reported in the register. The underreporting of such abortions was attributed to the legal requirement that such procedures be reported in two registration systems. However, abortions performed for fetal abnormalities seem to represent a very small proportion of the total number of abortions. The data on gestational age at the time of the abortion were also weaker than other data in the register, apparently due to errors in establishing the conception date.

Russian Federation

In the Russian Federation, legal induced abortions can be performed in hospitals only. Statistics from hospital records are collected by the Ministry of Health. About 5% of legal abortions are recorded separately by other ministries that have their own hospitals (Philipov et al. 2004).

Until 1988, early vacuum aspiration abortions (i.e., during the first three weeks of pregnancy), known as "mini-abortions," were not counted in Soviet abortion statistics. Starting in 1988, they were tabulated separately, and have been included in abortion statistics since then.* These changes affect not only levels of reporting, but also the trends in abortion incidence that can be inferred from official reporting.

Demographers have reviewed the Federation's statistical registration system, which has been in place for

*As a point of contrast, in Cuba, early vacuum aspiration abortions are considered menstrual regulations and are not counted in that country's abortion statistics.

several decades and was revised significantly in 1992–1993 (Philipov et al. 2004). Before 1992, abortions were categorized as spontaneous (miscarriages), induced upon request, therapeutic and performed "out of clinic." This last category includes all induced abortions performed outside a clinic for which women subsequently came to a public clinic for follow-up care (i.e., for treatment of medical complications). Many of these were initially performed in the private sector.

In 1992, the category "without clearly stated grounds" was added to the Russian Federation's classification system. Abortions performed outside of a registered facility began to be placed in this category, unless the woman had serious medical complications. Abortions "without clearly stated grounds" are not counted as induced abortions in official statistics. Another major change that seems to have affected the completeness of reporting is the growing practice of induced abortions performed outside the public sector (Philipov et al. 2004). The number of private facilities performing early abortions increased substantially in the 1990s (Philipov et al. 2004); moreover, if private-sector abortions are disproportionately obtained by some subgroups of women—for example, by urban or older women—then estimates of overall incidence in these subgroups will be skewed. Some induced abortions are also performed after hours in public hospitals because physicians can charge higher fees and women receive better care (Philipov et al. 2004).

To assess the quality of abortion reporting, researchers compared official statistics with findings from reproductive health surveys (Philipov et al. 2004). The survey-based estimates of abortion rates were very close to estimates from provider statistics for about two years preceding each survey. Although researchers interpreted the results to mean that official statistics are relatively complete, an alternative explanation is that both the official statistics and survey results underestimated the number of abortions by about the same amount. The survey estimates were progressively more prone to underreporting when moving further back in time.

Case Studies from North America

In several countries, including Canada, Switzerland and the United States, abortion statistics are collected by states or provinces under their laws. In the United States and Canada, national government agencies compile the state and provincial statistics (see examples discussed below). In Canada, the national agency attempts to fill in the gaps left by incomplete provincial reporting requirements. Several years ago, the U.S. Centers for Disease Control and Prevention (CDC) gave up making estimates for states without reporting systems.

Canada

The Canadian Institute for Health Information (CIHI) attempts to obtain counts of all legally induced abortions in Canada (CIHI 2003). The Institute also collects information on the demographic characteristics of women who obtain induced abortions and medical aspects of the abortions. Until 2004, some data were also collected on Canadian residents who obtained an abortion in selected American states.

CIHI obtains most of the data from provincial and territorial departments of health, but also receives data directly from hospitals and clinics. Depending on the department of health, the data collection instrument varies from a single sheet of paper with aggregate counts to detailed records submitted to CIHI electronically. When health departments report incomplete data, CIHI administers a one-page questionnaire to private clinics to obtain aggregate counts of the total number of induced abortions among Canadian residents, by province of residence. CIHI undertakes data-quality checks, including checks for internal consistency and comparisons of the most recent data with data from prior years to detect any unusual or unexpected changes that might indicate data error.

Abortion reporting was required by law until 1988 and up to that year, the system was considered to cover 100% of all legally induced abortions performed in Canada, although it omitted clinics that were operating openly but were considered by the national government to be illegal. CIHI estimated that as of 2000, the database represents approximately 90% of all abortions performed in Canada on Canadian residents (CIHI 2003). The statistics include abortions performed at hospitals and licensed clinics, but do not include procedures performed in doctors' offices or privately paid abortions that are not covered by provincial health insurance (Statistics Canada 2008). Procedures from providers who fail to report are denoted as missing data or are imputed on the basis of available information.

At the national level, the numbers of abortions obtained by Canadian residents in the United States and of those performed on nonresidents in Canada are unknown. Both are considered to be small.

There is a possibility of some overcounting in Canada's abortion database. If a patient is released but later realizes her abortion is incomplete and requires another procedure at the same or a different facility, she could be counted twice. This issue is particularly relevant with the growing popularity of medication abortions in Canada, as these procedures are more likely to be incomplete than are surgical abortions.

United States

For the last four decades, the CDC has collected abortion statistics from state agencies, which collect information from abortion providers. In 1978, the CDC proposed that a standard data collection form, which was last updated in 1997 (CDC 1998), be used by all states (see Appendix B for sample form). This form has not become a universal standard, however, and the data collection instruments continue to vary by state. Even so, many states follow the model closely by requesting identifying information about the facility and provider; demographic characteristics of the patient (age, marital status, education, race/ethnicity, pregnancy history); gestational age at time of abortion; and procedure used. The agencies from two states (Florida and Massachusetts) and the District of Columbia collect only summary statistics from providers. Many now allow for electronic reporting (Guttmacher Institute 2009; Nash 2009).

As an example of one U.S. state's form (which happens to be publicly available), the data collected in Michigan (Appendix C) include the typical set of questions and additionally asks about abortion complications, method of payment and other aspects of the procedure. However, the CDC does not recommend that complications be reported on the form, which is usually completed on the day of the procedure before many complications become apparent.

As of 2009, 46 states require hospitals, facilities and physicians providing abortions to submit regular and confidential reports to the state; statistics from these 46 states nevertheless vary in the completeness of their coverage (Nash 2009). Voluntary reporting, which yields only partial counts of abortions performed, takes place in two states (New Jersey and New Hampshire) and the District of Columbia. The two remaining states, California and Maryland, have no reporting systems to the federal level. Thus, the federal abortion surveillance reports based on collated health department data from the states provide incomplete abortion statistics. A private research organization provides more reliable estimates of national abortion incidence by periodically surveying abortion providers (discussed in Surveys of Abortion Providers section).

Case Studies from Asia

An estimated fifth of all abortions worldwide take place in China, and large numbers also take place in India and Vietnam (see three cases below). The abortion data collection systems in these countries therefore warrant close consideration. Available information on the data collection system in China is limited. Some—but not all—of the factors that compromise the accuracy of reports in China are unique to settings with stringent family planning policies.

China

Local health departments keep records of all medical procedures they perform, including induced abortions. The number of procedures is compiled at the national level by the Chinese Ministry of Health. These records are the basis for government reimbursements to the health departments, and the departments are therefore motivated to report all abortions. In fact, health departments have been known to report more abortions than are actually performed. Furthermore, health departments used to have incentives to underreport births and overreport abortions to gain political favor. However, as of the 1990s, when abortions came to indicate birth planning failure instead of success, overreporting may have given way to underreporting (Wei and Jinju 2007).

The Chinese Ministry of Health's number of hospital surgical procedures may omit some medication abortions and some abortions performed in private family planning clinics. China's Family Planning Commission also reports abortion statistics, which include abortions performed in family planning clinics but miss those performed in some hospitals. The Commission's estimates have become increasingly less reliable over the years.

India

Abortion is legal under broad grounds in India, but regulations require that abortions be performed by registered physicians in certified facilities. According to a recent, large-scale study, however, only 24% of private abortion facilities in the country are certified (Duggal and Ramacharan 2004a). The large numbers of abortions procured outside of certified facilities are not counted in official statistics. Moreover, many abortions that are performed by registered providers in certified facilities are not reported because accountability is not in place and the reporting system is widely known to be deficient. According to findings from a facility-based study conducted in six states (discussed in Surveys of Abortion Providers section), the total number of abortions performed in the country is nearly nine times higher than was indicated by official numbers reported to the Ministry of Health in 2003 (Duggal and Ramachandran 2004b).

Vietnam

Official abortion statistics for Vietnam are based on data collected by the public health system. The data in official health statistics yearbooks seem to include both spontaneous and induced abortions (Dzung and Xuan 2007). The government requires that public abortion providers report procedures to district ministries of health. These statistics are, in turn, funneled up to the provincial ministries and the national Ministry of Health. Completeness and accuracy of the system therefore depends on the quality of

reporting at each ministry level. An evaluation of the data collection system in the early 1990s revealed inconsistent reporting quality, with several provincial ministries failing to submit reports (Goodkind 1994). In addition, data collection instruments were not uniform across provinces. For example, some provincial ministries required that records be kept on each patient and others requested only summary information. Before 2000, pressure to meet annual public service targets might have resulted in some overreporting of induced abortions. However, abortion was dropped from the list of targeted services in 2000.

As of 1989, the government of Vietnam officially permitted health workers to engage in private practice. Since then, abortion procedures have increasingly shifted to the private sector, which is not covered by the public health reporting system. Many abortions are also performed in the "semi-private sector," meaning in public health facilities but after working hours; such procedures are missing from official counts. The dramatic declines in officially reported procedures from the mid-1990s to the early 2000s are attributed at least in part to the shift in abortion practice away from the public sector.

Surveys of Abortion Providers

In the absence of reliable government-sponsored reporting systems, private organizations in some countries compile information from individual abortion providers. This approach works well in the Netherlands, where good hospital statistics are available and abortions are performed in only a few nonhospital clinics. It works less well in the United States, where there are close to 2,000 providers, including private physicians and hospitals, many of whom perform only a few abortions. A survey of providers in India is unique in that inferences are made for the whole country on the basis of information obtained from a sample of providers in six states. We discuss these two countries' cases below.

United States

The Guttmacher Institute, a private research organization, has estimated abortion incidence by conducting periodic surveys of all known abortion providers in the United States since 1974, the year after abortion was legalized (Jones et al. 2008). The purpose of the surveys is to collect incidence data as well as information about abortion providers and the availability of services.

The survey attempts to reach every abortion provider in the country and thus can be considered a census. Facilities in which abortions are performed are identified using a variety of sources, including the membership directory of the National Abortion Federation, listings in classified telephone directories and online provider listings. Data from state agencies are also used where available.

The most recent effort obtained information on abortions performed in 2004 and 2005 (Jones et al. 2008). The questionnaire asked providers for the number of induced abortions they performed by year, the minimum and maximum gestations at which they will perform abortions, and fees charged for services. Clinics and physician providers were also asked about medication abortions.

For facilities that did not respond after extensive follow-up efforts, the Institute used a range of alternative estimation procedures: projecting from information available for earlier years or from state health department data, where these were deemed complete; obtaining estimates from knowledgeable sources in the communities of the nonresponding clinics; and drawing inferences on the basis of the numbers of procedures performed in similar responding facilities. Of the 1.21 million abortions reported for 2005, 76% were reported by providers; 12% came from health department data; 9% were estimated by knowledgeable sources; and 3% were projections or other estimates.

Past surveys of random samples of physicians and hospitals suggest that the true number of abortions is 3–4% greater than the number Guttmacher estimates (Henshaw and Van Vort 1994; Henshaw 1998). Abortion researchers have noted that underreporting might have become more pronounced after mifepristone was approved for early medication abortion in 2000, because facilities that only started offering abortion services with mifepristone might not have been identified and others might have been reluctant to report medication abortions (Jones et al. 2008). However, such facilities likely treated small numbers of women. In addition, providers that do not keep records of abortion services may have reported estimates rather than actual numbers, which can introduce random error in the resulting national estimate.

India

A research team in India estimated abortion incidence in the country in 2002 on the basis of a survey of providers working in 380 public- and private-sector facilities in six of the country's 28 states. The states were selected to represent the country's geographic, economic and health spectrum. Researchers used survey results to estimate the average number of abortions performed per year in each facility, and they used the ratio of providers to population in the sample areas to infer the number of providers in the country.

The findings indicate that about 4.8 million induced abortions are performed annually in formal facilities and another 1.6 million abortions are performed by informal

abortion providers, totaling roughly 6.4 million abortions annually in India.

This estimate is probably the most complete that is available so far for this country. However, the estimate should be taken with a few caveats. Perhaps foremost among these is that it is not clear whether the states and sites included in the study are representative of the providers in the country.

Surveys of Women

Many countries have national fertility surveys, that is, population-based surveys of women that ask about their reproductive history, current contraceptive practices and fertility aspirations. Many studies have demonstrated that questions about abortion history often suffer from underreporting. Surveys are also subject to sampling error and random variation.

Survey data are probably more reliable in countries where abortion is not stigmatized and where the practice is accepted. Abortion estimates based on surveys of women are available for about a dozen countries with liberal abortion laws. For three (South Korea, Turkey and Turkmenistan), nationally representative surveys of women are the only available source of abortion estimates. Abortion rates are estimated on the basis of women's reports of abortions within three or five years prior to the survey. Some of these surveys are limited by the exclusion of unmarried women. For example, the survey in South Korea was administered to currently married women only, and the survey in Turkey was administered to ever-married women only.

The Demographic and Health Surveys (DHS) and Reproductive Health Surveys, administered by Macro International and the CDC, respectively, are comprehensive surveys that are conducted periodically in developing countries and Eastern Europe, including a few countries where abortion is broadly legal. The surveys obtain detailed reproductive histories, including histories of induced abortion in a few countries. The survey questionnaire asks about women's total number of pregnancies. For each pregnancy, the interviewer records the duration of gestation; the outcome of the pregnancy (live birth, induced abortion, miscarriage or stillbirth); and, for those ending in abortion, the month and year of termination.

Researchers have attempted to assess the completeness of abortion reporting in surveys by comparing the results with national abortion statistics where these exist, or by surveying women who are known to have had an abortion according to hospital records. The results of such validation studies have been described in a recent comprehensive review (Rossier 2003). In France, surveys of women were estimated to have identified 50–60% of induced abortions in 1988 (Toulemon and Leridon 1992). In Estonia, 70% of women selected from hospital records for having had an abortion in 1991 reported having had an induced abortion in a 1992 survey (Anderson et al. 1994). In the Czech Republic, the reporting rate for abortion in a 1993 survey was found to be 45–50% complete (Czech Statistical Office et al. 1995).

Nevertheless, in some countries with incomplete national statistics, such as former Soviet-bloc nations, surveys of women provide better estimates of abortion incidence than national data systems. For example, in Ukraine, the abortion rate derived from national statistics was 28% lower than the rate estimated from the 1999 DHS (Kiev International Institute of Sociology et al. 2001). A variety of factors can explain the relatively strong performance of surveys of women in these countries, including low levels of stigma associated with abortion and the fact that national statistics cover public-sector abortions only.

Survey estimates can be useful even if there is some underreporting, particularly where abortion rates are high, because the surveys provide a minimum estimate of abortion incidence. For example, the highest legal abortion rate found for any country in the 2003 worldwide compilation of abortion statistics—Georgia's, with 135 abortions per 1,000 women aged 15–44—was based on a fertility survey. Even if this estimate understates the true rate in the country, it indicates an extremely high incidence of abortion there.

Insurance Claims and Hospital Statistics

In countries without comprehensive national reporting systems, the number of abortions can sometimes be estimated from a combination of other data sources, specifically insurance reimbursement reports and hospital service statistics. In France, for example, the mandated reporting system has become increasingly unreliable, but insurance reimbursement data provide more complete abortion numbers, though these records provide no information on the characteristics of women having abortions. In Australia (see below), a national abortion data collection system is not in place and researchers have had to piece together data from private- and public-sector sources to develop estimates for 1985–2003. Abortion statistics are collected for one state, South Australia, and these data were used to make adjustments for errors in the private and public data sources.

Australia

Researchers have taken advantage of insurance claims (i.e., abortions paid for by the universal health insurance system, Medicare) and hospital records to estimate the incidence of abortion in the country (Chan and Sage 2005).

For hospital data, it is necessary to determine which diagnosis codes will be taken to represent induced abortions. Problems arise when the same code can apply to both induced and spontaneous abortions. Further problems occur when an incomplete abortion results in double reporting (once for the original procedure and again for completion of the abortion).

Validation of the insurance-based estimates against statutory records in South Australia indicated that Medicare claims by private patients overestimated their abortions by about 19%. This overestimation is attributed to the Medicare classification system, which resulted in the inclusion of some spontaneous abortions in the count. However, not all private clinic patients submitted claims for Medicare reimbursement, and researchers need to also adjust the numbers to account for this underreporting (estimated at 14% of private patients). Validation of the numbers of public abortions found that the number was overestimated, albeit by a small margin (about 2.3%), arising primarily from readmissions.

Summary and Conclusions

Since 1997, criteria for legal abortion have been substantially broadened in 19 countries or administrative areas and about 70 countries now have liberal abortion laws (Boland and Katzive 2008). In countries with recently liberalized laws, it is now possible to collect information on the number of legal procedures performed. In other countries where abortion has been broadly legal for some time, reliable data collection systems are still not in place or current systems can be improved. As this review demonstrates, the accurate measurement of abortion incidence requires careful planning and administration.

The countries with fairly complete reporting systems share several important characteristics: reporting is mandatory; responsible agencies take an active role in ensuring complete coverage; and these agencies identify and fill gaps in reporting through inference, imputation and follow-up with nonreporting providers. All these efforts require financial and human resource investments.

This chapter represents an introduction to the issues that affect the quality of abortion reporting, rather than a comprehensive review of all such challenges. However, the detailed country case studies reveal many shortcomings in national abortion data collection procedures. Consultations between data collection agencies across countries can potentially improve national data collection efforts based on lessons learned. Efforts to assure complete reporting will have to address the following issues:

- *Persistent focus on public-sector abortions in countries where the incidence of private-sector abortions is growing.* This has been described here for the Russian Federation and Vietnam, and there is evidence that it affects national statistics in several former Soviet countries and elsewhere.
- *Rise in medication abortions.* Systems in place are not capturing the increasing use of misoprostol and mifepristone for self-induced abortions. They are also missing the medication abortions provided at facilities that do not generally perform abortions and thus do not report these procedures.
- *Double counting of abortions.* As we have documented in Canada, this occurs when a patient requires follow-up care for an incomplete abortion, and both the original procedure and treatment for its complications are counted. The problem could become more significant as medication abortions increasingly replace surgical procedures, because women having medication abortions are more likely to seek care for incomplete procedures.
- *Uneven quality of reporting across states or provinces in federated countries.* This issue is known to apply to the United States, Switzerland and Canada.
- *Inclusion of miscarriages in abortion reporting systems.* We described this problem in Australia's hospital records, and it is probably relevant in a number of countries, including a few former Soviet countries.
- *Reporting of cross-border procedures.* Ideally, a county's abortion count should refer to procedures obtained by its residents only, rather than to the numbers of abortions that are performed within its borders. In most cases there is little difference between these two counts because few women cross national boundaries for abortion services. Among the exceptions are Belgium, England and Wales, and the Netherlands, where significant numbers of women from other countries obtain abortions. For example, abortions obtained by German women in the Netherlands and by Irish women in England and Wales should be included in Germany's and Ireland's counts, respectively.
- *Reporting linked to reimbursement.* Linking abortions to government reimbursements seems to increase the likelihood of complete reporting in many European countries but has also probably led to the exaggeration of numbers in China and Vietnam.
- *Underreporting in population-based surveys of women.* Evidence suggests that the level of underreporting in surveys varies by country. Thus, developing a uniform method of adjusting for such underreporting is difficult to do.

Despite the limitations of many current systems to count or estimate abortions in countries where the procedure is broadly legal, these efforts and the resulting statistics have proven useful. The incidence of induced abortion is generally a good indicator of the incidence of unwanted pregnancy, even if a very low proportion of abortions are performed to protect the health of the woman or because the fetus has severe abnormalities incompatible with life. Data on abortion levels and trends can inform policies and programs to satisfy unmet need for contraception and reduce unwanted pregnancy. Moreover, comparing legal abortion estimates with estimates of abortion in countries with highly restrictive laws allows us to better understand how the legal climate affects the incidence of abortion and its impact on women's health. More generally, empirical evidence documenting abortion incidence brings attention to the reality of abortion in women's lives.

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APPENDIX A.
Estimating Abortion Rates and Ratios

Reported or estimated numbers of abortions are usually used to calculate abortion rates and ratios. Specifying the denominators of these measures carries another set of challenges.

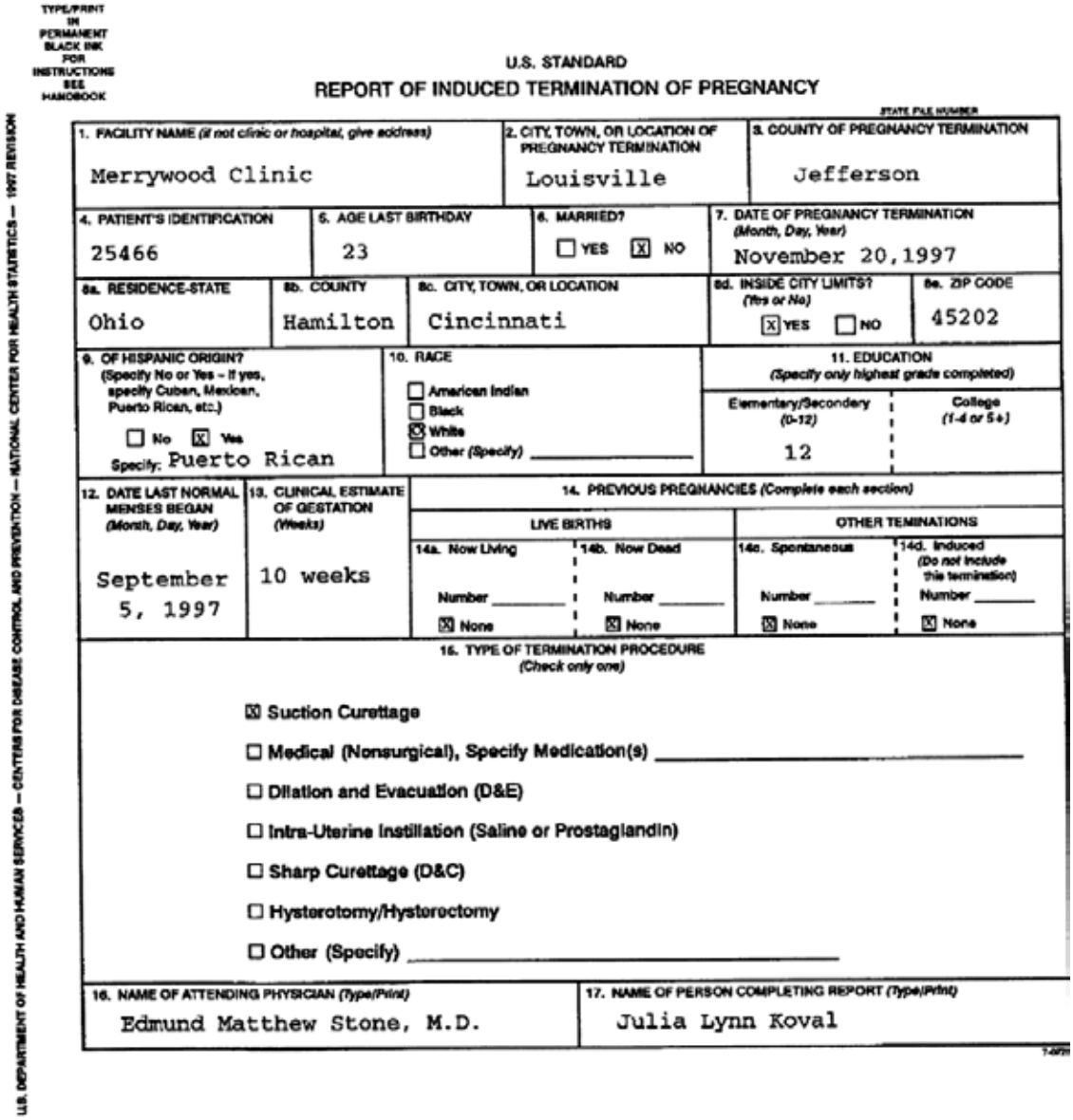
Briefly, abortion rates require data on the number of women of reproductive age in the country, that is, the number of women aged 15–44 or 15–49 in the population at mid-year. The numerator is usually all abortions to all women in a given year, even though some may have occurred when the woman was younger than 15 or older than the maximum age in the denominator. With this information, abortion incidence can be measured as the annual number of abortions per 1,000 women of the defined age-group in the population, and abortion levels can more easily be compared across populations.

To calculate abortion ratios—the number of annual abortions per 100 or 1,000 live births in the population—it is most appropriate to use births that were conceived during roughly the same time period as the pregnancies that ended in abortion. To accomplish this, some demographers use "lagged" birth estimates; that is, they use births occurring six months later than the date of the terminations. The ages of women having abortions or giving birth are either completed years at the time of the event or the age attained during the calendar year of the event. Population and live birth data can be obtained from country sources or the United Nations World Population Prospects database.

Abortions can also be calculated as a proportion of all pregnancies. The denominator of this proportion is comprised of all abortions, live births, miscarriages and stillbirths in the population; mathematical models based on clinic studies have been used to estimate numbers of miscarriages and stillbirths for these purposes.

Sources: United Nations Department of Economic and Social Affairs-Population Division, *World Population Prospects: The 2008 Revision Population Database*, UN, 2009, <http://esa.un.org/unpp/>, accessed Mar. 1, 2010; and Singh S et al., *Abortion Worldwide: A Decade of Uneven Progress*, New York: Guttmacher Institute, 2009.

APPENDIX B.



TYPE/PRINT IN PERMANENT BLACK INK FOR INSTRUCTIONS SEE HANDBOOK

U.S. STANDARD

REPORT OF INDUCED TERMINATION OF PREGNANCY

STATE FILE NUMBER

1. FACILITY NAME (If not clinic or hospital, give address)	2. CITY, TOWN, OR LOCATION OF PREGNANCY TERMINATION	3. COUNTY OF PREGNANCY TERMINATION
Merrywood Clinic	Louisville	Jefferson

4. PATIENT'S IDENTIFICATION	5. AGE LAST BIRTHDAY	6. MARRIED?	7. DATE OF PREGNANCY TERMINATION (Month, Day, Year)
25466	23	☐ YES ☒ NO	November 20, 1997

8a. RESIDENCE-STATE	8b. COUNTY	8c. CITY, TOWN, OR LOCATION	8d. INSIDE CITY LIMITS? (Yes or No)	8e. ZIP CODE
Ohio	Hamilton	Cincinnati	☒ YES ☐ NO	45202

9. OF HISPANIC ORIGIN? (Specify No or Yes – If yes, specify Cuban, Mexican, Puerto Rican, etc.)	10. RACE	11. EDUCATION (Specify only highest grade completed)	
☐ No ☒ Yes Specify: Puerto Rican	☐ American Indian ☐ Black ☒ White ☐ Other (Specify) _____	Elementary/Secondary (0-12)	College (1-4 or 5+)
		12	

12. DATE LAST NORMAL MENSES BEGAN (Month, Day, Year)	13. CLINICAL ESTIMATE OF GESTATION (Weeks)	14. PREVIOUS PREGNANCIES (Complete each section)			
		LIVE BIRTHS		OTHER TERMINATIONS	
		14a. Now Living	14b. Now Dead	14c. Spontaneous	14d. Induced (Do not include this termination)
September 5, 1997	10 weeks	Number _____ ☒ None	Number _____ ☒ None	Number _____ ☒ None	Number _____ ☒ None

16. TYPE OF TERMINATION PROCEDURE (Check only one)

- ☒ Suction Curettage
- ☐ Medical (Nonsurgical), Specify Medication(s) _____
- ☐ Dilation and Evacuation (D&E)
- ☐ Intra-Uterine Instillation (Saline or Prostaglandin)
- ☐ Sharp Curettage (D&C)
- ☐ Hysterotomy/Hysterectomy
- ☐ Other (Specify) _____

16. NAME OF ATTENDING PHYSICIAN (Type/Print)	17. NAME OF PERSON COMPLETING REPORT (Type/Print)
Edmund Matthew Stone, M.D.	Julia Lynn Koval

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES — CENTERS FOR DISEASE CONTROL AND PREVENTION — NATIONAL CENTER FOR HEALTH STATISTICS — 1997 REVISION

PHS-T006
REV. 12/97

APPENDIX C.

MICHIGAN DEPARTMENT OF COMMUNITY HEALTH

ABORTION REPORT

☐ CORRECTION

No.

1a. RESIDENCE OF PATIENT – CITY OR TOWNSHIP	1b. COUNTY	1c. STATE	2. RACE OF PATIENT – American Indian, Asian, Black, White, Pacific Islander

3. AGE OF PATIENT	4. MARITAL STATUS	5. NUMBER OF PREVIOUS PREGNANCIES CARRIED TO TERM	6. NUMBER OF PREVIOUS PREGNANCIES ENDING IN MISCARRIAGE OR SPONTANEOUS ABORTION	7. NUMBER OF PREVIOUS PREGNANCIES TERMINATED BY INDUCED ABORTION	8. FIRST DAY OF LAST NORMAL MENSTRUAL PERIOD (MONTH, DAY, YEAR)	9. GESTATIONAL AGE IN WEEKS
	_ MARRIED _ NOT MARRIED	NONE ___	NONE ___	NONE ___		

10. METHOD USED TO CONFIRM PREGNANCY	11. SOURCE OF REFERRAL	12. PROCEDURE (INDICATE ALL)	13. IMMEDIATE COMPLICATIONS (INDICATE ALL)
1 ___ HOME URINE TEST 2 ___ CLINICAL LAB URINE TEST 3 ___ CLINICAL LAB BLOOD TEST 4 ___ ULTRA SOUND 5 ___ NOT TESTED 8 ___ OTHER - ***SPECIFY BELOW*** * 9 ___ UNKNOWN	1 ___ PHYSICIAN 2 ___ SELF (TV, RADIO, ETC.) 3 ___ FRIEND OR FAMILY 4 ___ CLERGY 5 ___ SOCIAL AGENCY 6 ___ HEALTH DEPARTMENT 7 ___ FAMILY PLANNING AGENCY 8 ___ OTHER - ***SPECIFY BELOW*** *	1 ___ SUCTION CURETTAGE 2 ___ MEDICAL (NONSURGICAL) 3 ___ DILATION AND EVACUATION (D&E) 4 ___ SALINE OR PROSTAGLANDIN 5 ___ SHARP CURETTAGE (D&C) 6 ___ HYSTEROTOMY/HYSTERECTOMY 8 ___ OTHER - ***SPECIFY BELOW*** *	0 ___ NONE 1 ___ SHOCK 2 ___ UTERINE PERFORATION 3 ___ CERVICAL LACERATION 4 ___ HEMORRHAGE 5 ___ ALLERGIC RESPONSE 6 ___ INFECTION 7 ___ DEATH 8 ___ OTHER - ***SPECIFY BELOW*** *

14. DID FETUS SHOW EVIDENCE OF LIFE WHEN SEPARATED, EXPELLED OR REMOVED FROM THE WOMAN?	15. WEIGHT OF FETUS (IF DETERMINABLE)	16. DATE ABORTION PREFORMED (MONTH, DAY, YEAR)	17. SOURCE AND METHOD OF PAYMENT
1 ___ YES 2 ___ NO	___ GRAMS ___ NOT DETERMINABLE		1 _____ SELF PAY 2 _____ INSURANCE (SPECIFY)

18. FACILITY WHERE ABORTION PERFORMED – TYPE OF FACILITY	19a. FACILITY LOCATION – CITY, VILLAGE OR TOWNSHIP	19b. COUNTY
1 ___ HOSPITAL 2 ___ HOSPITAL SATELLITE CLINIC 3 ___ FREE STAND. OUTPATIENT SURGICAL FACIL. 4 ___ PHYSICIAN'S PRIVATE OFFICE 8 ___ OTHER - ***SPECIFY BELOW*** *		
	20a. PHYSICIAN LICENSE NUMBER	20b. SIGNATURE OF PHYSICIAN

Mail to: Vital Records and Health Data Development Section
Attn: Nosology Unit
P.O. Box 30691
Lansing, MI 48909

INSTRUCTIONS

A physician who performs an abortion, being the intentional use of an instrument, drug, or other substance or device to terminate a woman's pregnancy for a purpose other than to increase the probability of a live birth, to preserve the life or health of the child after live birth, or to remove a dead fetus, is required by section 2835 Public Act 368 of 1978 to report the event to the Department of Community Health within 7 days. Such reports are confidential statistical reports. No information other than that called for by this form is to be reported. Failure to provide the required information is a misdemeanor punishable by imprisonment of not more than 1 year or a fine of not more than $1,000.00 or both.

In completing this form enter the appropriate response in the space provided, or check the appropriate box. For the purposes of completing this report the following definitions should be used:

Item 5 -- "pregnancies carried to term" describes pregnancies of 37 weeks gestational age or longer, regardless of outcome.

Item 6 -- "miscarriage or spontaneous abortion" is defined as non-induced terminations of pregnancy of less than 20 completed weeks gestational age, regardless of outcome.

Item 14 -- "evidence of life is constituted by breathing, beating of the heart, pulsation of the umbilical or definite movement of muscles. (Note that the fetus showing such evidence of life is reportable as a live born.)

Correction to previously forwarded reports can be made by checking the box marked "correction" indicating the information to be changed as it should be reported.

DCH-0819w (10/02)

CHAPTER 3

Three Approaches to Improving the Use of Face-to-Face Interviews to Measure Abortion

Heidi Bart Johnston, Jeffrey Edmeades, Laura Nyblade, Erin Pearson, Florina Serbanescu and Paul Stupp
(Contributor: Stephanie McMurtrie; Coordinator: Sandra G. Garcia)

In theory, measuring the incidence of abortion using women's reports from population-based, face-to-face surveys offers many advantages over indirect estimation techniques. The use of self-reports allows direct estimates of abortion levels among all subgroups of women (including those who seek care outside the formal health system); provides geographic, demographic and socioeconomic characteristics of women who have had abortions (thus identifying subgroups with high unmet need for family planning); simplifies analysis because both the numerator and denominator of interest are readily measurable; and allows abortion to be examined in context with other sexual and reproductive health data.

In practice, however, estimates derived from population-based surveys on sensitive behaviors such as abortion are especially susceptible to a range of problems, including underreporting, misreporting, social courtesy bias and recall bias. Abortion reporting in sample surveys is known to be influenced by the nature of the survey, the wording of the questions, the legal environment and the broader social and religious context of public opinion about abortion. Women who are asked about induced abortion in face-to-face interviews may be reluctant to answer truthfully given their concerns about social disapproval, self-incrimination if the procedure is legally restricted and invasion of privacy regarding such an intimate, sensitive topic. Even in countries where abortion is legal and well documented, such as the United States, abortion is still significantly underreported in sample surveys (Jones and Forest 1992; Fu et al. 1998; Jones and Kost 2007).

Given the pros and cons to collecting abortion data using direct surveys, researchers have long sought ways to adapt and modify face-to-face surveys to improve their utility in estimating abortion. The importance of drawing on contextual data to inform the collection of information on sensitive behaviors has long been recognized as one way to improve the quality of the data. For example, when Stone and Campbell (1984) conducted a study in rural Nepal to evaluate the precision of a contraceptive prevalence survey, they first implemented a standardized survey in an area where they had previously developed a good rapport with residents. Following the survey they conducted open-ended interviews with villagers about their responses. The researchers found that many respondents had interpreted questions differently from the intended meaning and that nonsampling error was much greater than standard sampling error. They concluded that using qualitative research techniques to supplement and complement quantitative techniques can improve data validity and reduce nonsampling error.

In separate studies Anderson and coauthors (1994) and Huntington and coauthors (1993) reported success in collecting abortion data with a filter question. In Anderson's study, women were asked if they had ever had a pregnancy that did not result in a live birth. In Huntington's, respondents were asked if they had ever had an unwanted pregnancy. Respondents who answered affirmatively to the filter question were then asked what they did when faced with the pregnancy. The filter question in those surveys was meant to reduce the stigma associated with induced abortion and to make reporting easier for the respondent.

In a later study, Huntington and colleagues (1996) recognized the difficulty of obtaining precise estimates of induced abortion from direct survey questions and evaluated a survey technique for measuring induced abortion within the context of unwanted pregnancy. The technique was incorporated into multiple Demographic and Health Surveys (DHS). Results from countries in Africa, Asia and South America indicated that "no single, universally sensitive context for discussion of induced abortion may exist." Huntington and coauthors concluded that methods to successfully estimate rates of induced abortion varied by setting. They recommended conducting qualitative background research to find a way to introduce abortion questions in a relatively nonthreatening, nonstigmatizing context.

This chapter presents three examples of attempts to modify face-to-face surveys in three settings—Bangladesh, India and Eastern Europe. These modifications to improve the reliability of face-to-face interviews in measuring abortion include the following:

- implementing a new protocol known as the Abortion Frequency Survey (AFS) in Matlab, Bangladesh (Part I);
- using a "narrative" survey technique in Madhya

Pradesh, India (Part II); and

- adding a special abortion module to Reproductive Health Surveys (RHS) in Eastern Europe (Part III).

The AFS and "narrative" survey technique both incorporate qualitative methods to gather preliminary information on the local context and language of abortion; this information is then used to shape the final survey instrument. Both methods allow for probing to obtain key revelations on abortion during the interviews. All three modifications discussed in this chapter yielded higher estimates of abortion than those obtained through usual large-scale national surveys. The possible drawbacks of these modifications include the extensive training required for the interviewers, as well as the extra time needed to conduct more comprehensive face-to-face interviews.

Part I. Application of the AFS in Matlab, Bangladesh

Heidi Bart Johnston

The AFS was specifically designed to generate a realistic estimate of induced abortion in settings where it is a highly sensitive issue and the population is mostly illiterate, and was applied in Matlab, Bangladesh, in 1997 (see Johnston 1999 and Chapters 4 and 9 of this volume). Its techniques are guided by findings from reproductive health survey research on sensitive topics. The protocol has two components: 1) an initial qualitative research component to build a contextual foundation; and 2) a semistructured interview that quantifies abortions and related events.

Presurvey, Qualitative Research on Context of Abortion

Qualitative research provides background information on the following: the local terminology used for the proximate determinants of fertility, particularly abortion; women's perceptions of abortion; different abortion techniques and how women perceive various types of abortion providers; women's cultural interpretation of abortion; and the varying degrees of social stigma associated with using abortion to regulate fertility in different circumstances. The qualitative research methods used will vary depending on the setting.

In the application of the AFS in rural Matlab, Bangladesh, key informant interviews were conducted with 19 purposively selected married women of reproductive age and seven providers of menstrual regulations (MR) and induced abortions. In Bangladesh, where induced abortion is legally permitted only to save a woman's life, MR with vacuum aspiration is available at public-sector health facilities at all levels of care (primary, secondary and tertiary) and is considered to be an "interim method for establishing nonpregnancy." The procedure is allowed up to 10 weeks since a woman's last menstrual period, but in practice, it is sometimes provided beyond this limit. For this chapter, MR is grouped with induced abortion, even though no test is done to establish pregnancy before MR (with vacuum aspiration) is performed.

Since most of the 19 informants were interviewed more than once, a total of 43 interviews took place, in addition to the in-depth interviews with abortion providers. The seven providers included the following: a traditional healer, or *kobiraj;* two Family Welfare Visitors who provided MR procedures at the government health complex in Matlab; one village doctor, an informally trained pharmacist with a kiosk in a village market; one homeopath with a kiosk in a village market; and two Community Health Workers employed by ICDDR,B, a public health research institute that distributes contraception and conducts demographic surveillance. Prior to beginning each interview, the interviewer explained the research and read a consent form to the informant assuring confidentiality. The consent form was signed or stamped by the informant. Interviews were conducted in private; if that privacy was compromised in any way, the interviewer would change the topic.

The contextual background research showed that women in Matlab were indeed familiar with induced abortion and that the terminology used to discuss pregnancy and induced/spontaneous abortions was ambiguous. The qualitative research also documented the gamut of providers and methods of inducing abortion, how much women paid for an abortion and their perceptions of the pros and cons of using different methods or providers. These findings informed the development of the survey instrument, which used local terms, phrases and concepts. The following five findings were central to developing the survey instrument, and thus demonstrate the utility of the presurvey protocol.

- Regular menstruation is culturally very important. Key informants were much more able to talk about "stopping and starting menstruation" than about unwanted pregnancy or induced abortion. As a result, a menstrual history section preceded and introduced the survey questions on abortion.
- Key informants were at times ambiguous when talking about the reasons behind "stopped menstruation." The menstrual history section that preceded the induced abortion section attempted to identify the cause.
- Induced abortion was perceived as relatively acceptable in certain circumstances, including poverty and poor health. The survey question that introduced

the topic of induced abortion used examples that respondents offered as circumstances that can justify terminating a pregnancy.

- Key informants reported five main types of providers of induced abortion, each of whom used distinct techniques. The semistructured survey incorporated this information by asking how often respondents turned to these specific providers and the outcomes of abortion attempts from specific providers.
- Key informants reported that some locally used methods of terminating pregnancies were ineffective. Women may go to multiple providers before obtaining a complete abortion or finally deciding to keep the pregnancy. This finding resulted in a survey question that used the language "treating unwanted pregnancies" instead of inducing an abortion or discontinuing a pregnancy. The survey was also designed to document multiple attempts to terminate a single pregnancy.

Survey Instrument

Results of the qualitative, presurvey research then guide the development of a culturally informed, semistructured data collection instrument for measuring the incidence of abortion. The instrument integrates a filter question similar to that promoted by Huntington (Huntington et al. 1993) and blends qualitative and quantitative research techniques. The interviewer uses a reproductive events calendar to probe extensively to elicit details of reported events. The structure and wording of the survey instrument depend on the findings from the presurvey research on context.

In Matlab, the semistructured survey of both open and closed questions was divided into sections covering the following reproductive events: marriage, birth, contraceptive use, menstruation/pregnancy and induced abortion (See supplementary documents at end of online version of this volume for the English-language instrument used). Interviewers used responses to the survey to complete a calendar representing the past six years of the respondent's reproductive events. The instrument was a mix of fixed specific queries and the interviewers' own questions and probes to elicit responses. The use of a general framework rather than a specific set of questions was meant to encourage interviewers to use a conversational tone and put the respondent at ease.

The marriage section also included questions needed to construct a table on when the husband was at home, an important factor in the Bangladeshi context where domestic and international labor migration is common and husbands and wives often live separately for long stretches of time. We assumed that a separation lasting 20 days or more—and the subsequent unlikelihood of intercourse during the fertile period—substantially reduced a woman's risk of pregnancy. While many respondents were unable to precisely report all separations lasting 20 days or more over the previous six years, the interviewer learned whether the respondent lived with her husband most of the time or only infrequently.

The birth history section, which contained questions needed to generate a birth history table, was used to determine fecundability. Women in Matlab tended to report gestation in 10 lunar months, not Bengali or Gregorian calendar months. These were recorded as nine months of pregnancy, with the 10th month being the month of the birth and the first month of postpartum amenorrhea.

For the contraception section, interviewers completed a table of women's modern and traditional method use over the past six years, using uppercase letters for highly effective methods with low user-failure rates and lowercase letters for methods that are not highly effective or that are subject to user failure. Interviewers probed for unwanted pregnancies when the respondent was using a method represented by a lowercase letter, but generally did not if she was using a method represented by uppercase letters. However, in the event of frequent back-and-forth switching (for example, between the injectable and the pill), interviewers were instructed to probe for unwanted pregnancies. They were also instructed to find out when the respondent used different methods and why she dropped a method if she did.

The menstruation/pregnancy questions were used to determine whether amenorrhea was linked to pregnancy. Interviewers asked the dates that menstruation had stopped and resumed, symptoms of stopped menstruation, respondents' perceptions of why menstruation stopped and how menstruation started again. If the respondent reported a spontaneous abortion, the interviewer was instructed to probe to determine if the abortion was actually induced.

At the end of the menstruation/pregnancy section, questions about ideal family size and unwanted pregnancy set the stage for the induced abortion section. This introductory question reads:

> *Sometimes women have enough children, and they feel if they had more children they would not be able to feed, clothe, or educate them. Sometimes women become pregnant soon after giving birth. A woman may feel a pregnancy so soon after birth would endanger her own health and the health of her young child. Please tell me what a woman would do if she had a pregnancy she could not afford, or that threatened her health?*

A filter question about unwanted pregnancies followed. If a respondent reported having had an unwanted pregnancy, the interviewer asked what she did in that situation and took notes. If the respondent reported aborting the unwanted pregnancy, the interviewer asked for the date her menstruation stopped; the first (or second or third, if applicable) treatment or provider she sought; the date bleeding started again; and whether any postabortion complications occurred. This information was recorded in the MR/abortion table. The interviewer then asked about other unwanted pregnancies.

If the respondent never had an unwanted pregnancy or reported that she did nothing when she had one, the interviewer probed for more information.* When the interviewer felt confident that the respondent reported truthfully or was unwilling or uncomfortable sharing additional information, the interviewer continued to the calendar for a final review.

The reproductive events calendar is a longitudinal record of reproductive events that is similar to the one used in DHS surveys. The calendar is a tool to aid recall by encouraging respondents to link events chronologically and guiding interviewer probing by revealing gaps and inconsistencies in reported reproductive histories. In the Matlab application of the protocol, the calendar allowed for the chronology of events to be recorded in either the Bengali or Gregorian calendar. When unexplained periods of infertility appeared in the calendar, interviewers probed to discover which of the four proximate determinants of fertility was causing it—contraceptive use, postpartum infecundability, lack of exposure to sexual intercourse or induced abortion. During the final calendar review, interviewers made corrections and entered explanations in the margins.

Survey Implementation

The survey staff included a manager, a quality control team of three supervisors and 12 interviewers. Prior to the fielding of the household survey, interviewers and supervisors received seven days of training, which included the following: the background of the study; its objectives; an introduction to the survey instrument; training in the proximate determinants of fertility and in conducting semistructured interviews; role playing with the survey instrument; and survey guidelines. Interviewers were also trained to recognize contradictory or unlikely reproductive events and situations conducive to unwanted pregnancy; when these situations arose, interviewers were instructed in how to probe respondents. To maintain consistency over time, progress workshops were held frequently at the beginning of the survey's implementation and every other week near the end of the survey.

The AFS was fielded in Matlab, Bangladesh, from July through September of 1997. It used a stratified random sample design with proportional allocation; strata were designated at the village level. The total sample size for the survey was 972, of whom 909 were successfully interviewed for a response rate of 94%. (Twenty-one women declined to be interviewed, 12 were absent for all three interview attempts, 18 had moved out of the area and 12 were away for the entire duration of the survey.) Interviews required 45–90 minutes. On average, each interviewer conducted about two interviews per day. As with the qualitative component, prior to beginning each interview the interviewer explained the research and the respondent signed or stamped a consent form assuring confidentiality. Interviews were conducted in private; if that privacy was compromised in any way, the interviewer would change the topic.

Results using semistructured questionnaires will vary according to individual interviewers' ability to recognize inconsistencies in women's reproductive histories as recorded in the calendar. To reduce variation by interviewer, we implemented a system of consistency checks and validations. Daily, interviewers submitted completed surveys to a quality control supervisor who examined the survey and calendar for inconsistencies (e.g., a reproductive event being noted in the calendar and not in the survey; incompatible reproductive events noted in a single month in the calendar; signs of having had an induced abortion without an abortion having been noted or an explanation from probing, etc.). When an inconsistency was found, the supervisor discussed it with the interviewer. If necessary, a supervisor would return to the respondent and conduct the interview a second time. Surveys were also randomly selected for validation. Validation interviews were compared with the original interview and differences were discussed with the interviewer. In total, 33 consistency checks and 17 validations were conducted (accounting for 5% of the total sample).

Quantitative Findings from an Application of the AFS

The 909 respondents who were successfully interviewed reported a total of 64 completed induced abortions, which is equivalent to an annual abortion rate of 11.7 abortions per 1,000 women, or a total abortion rate of 0.4 abortions per woman over her reproductive lifetime. The questions

*The probes were specific to each respondent, and were meant to be asked in a conversational manner. Depending on the situation, the interviewer might use probes such as: "Sometimes a woman cannot take her pills every day, and as a result, she may have delayed menstruation. Has this ever happened to you?" or "When you had an unwanted pregnancy, did you talk with the community health worker about it? If yes, what did you discuss?"

on attempts to abort unwanted pregnancies allowed us to quantify multiple attempts: Of the total of 108 women who made an abortion attempt, 41 had a complete abortion on their first attempt but 67 failed. Of these 67 women whose first attempt failed, 37 underwent a second attempt, which resulted in 18 completed abortions and 19 still incomplete abortions. Nine of these 19 women made a third attempt to abort their pregnancy; five succeeded and four did not. Thus, for the 108 unwanted pregnancies that women tried to abort in the past six years, they made a total of 154 attempts to induce an abortion; 64 pregnancies (59%) were successfully aborted and 44 (41%) were not.

On their first abortion attempt, women most commonly tried to self-induce using oral contraceptive pills and the iron tablets that serve as placebo pills in the contraceptive pill packets distributed in Matlab. Treatment from a homeopath or Family Welfare Visitor was almost as common for first attempts. On their second attempt, women most commonly requested MR from a Family Welfare Visitor (12 of 13 of these procedures succeeded); other second attempts involved going to a village doctor who is known to give intramuscular injections in the upper arm or pills to "start" menstruation (only two of 12 of these succeeded). On their third attempt, women most commonly requested MR from a Family Welfare Visitor (all four of these attempts were successful).

The survey also elicited information on cultural perceptions of abortion. When asked what a pregnant woman should do if her health was not good enough to carry the pregnancy to term or is unable to feed, clothe or educate a child, 44% of respondents volunteered that the woman should abort the pregnancy; 32% said she should keep the pregnancy; 17% responded that abortion is a sin, but did not propose an action; 3% said the woman should have used family planning to prevent the pregnancy; and 2% said the husband or the doctor should decide the course of action.

Assessment of the AFS: Comparison with Other Abortion Data

The AFS was implemented in an area where other direct estimates of abortion are available to compare the protocol's results against. The research institution ICDDR,B has been collecting data through its Demographic Surveillance System (DSS) since 1966, and the Matlab DHS (MDHS) was conducted in 1994 to validate results of the 1993–1994 Bangladesh DHS. The AFS generated substantially different annual rates of abortion per 1,000 women than the DSS and the MDHS (Figure 1, see figures at the end of the chapter). Data from the longitudinal Matlab DSS for the period 1989–1996 show a steady rate of just under five abortions per 1,000 women for the eight-year period. Results from the MDHS show annual rates increasing from 0.3 to 2.1 abortions per 1,000 women. AFS-derived rates were not significantly different from DSS-derived rates until 1996, when the AFS rate increased to 14.4 abortions per 1,000 women. The rate derived from the protocol continued to increase, reaching 23.6 abortions per 1,000 women in the year the survey took place, 1997.* The sharp increase in abortions reported at the beginning of 1997 suggests recall and/or reporting bias in the prior years.

In sum, both the longitudinal DSS and the cross-sectional AFS yielded higher abortion rates than the cross-sectional MDHS. However, even though rates derived from the DSS and the AFS were similar for 3–6-years prior to the AFS, the most recent AFS abortion rates—those for the two years immediately preceding the 1997 AFS—are significantly higher than the DSS rates.

One can speculate that none of the three surveys reflects the true rates and trends of abortion in Matlab. The high rates of induced abortion found in 1997 through the protocol are thought to be closest to reflecting true rates for several reasons. First, the protocol has an abortion-specific focus and was developed and implemented based on lessons learned from previous abortion survey research methodologies and from qualitative research findings on abortion in the Matlab area. In contrast, in the DSS and MDHS, abortion is one of many demographic and health topics covered. Second, respondents are unlikely to over-report stigmatized events such as abortion; support for this point comes from informants (who were also DSS respondents) who reported concealing MR and abortions in their responses to the DSS. Third, the most recent rates of abortion from the AFS (1997) would have been less affected by recall bias than would the earlier AFS estimates. And finally, though the protocol's rates appear high compared with rates generated by the other direct surveys implemented in Matlab, an annual rate of 23.6 abortions per 1,000 women is just below the estimate of 26–30 provided for Bangladesh by Singh et al. in 1997. The AFS rate is within the range of rates in other countries with reputable provider registration systems (e.g., it is virtually identical to the 1990 rates in the United States and Singapore, to name just two) (United Nations 1995).

Discussion

This comparison of results from three direct surveys conducted in the same geographical area and time period

*To generate an estimate for the entire year, the seven abortions reported as taking place between July and December 1996 were added to the 16 abortions reported between January and June of 1997, resulting in an estimated 23 induced abortions among the sample of 909 women in 1997.

demonstrates again the difficulties in ascertaining accurate rates and trends of induced abortion from survey research. The different rates and trends are likely related to the distinct data collection techniques employed. Each technique is differentially affected by recall bias, respondent and interviewer courtesy bias, sensitivity to cultural norms, and the scope and purpose of the survey.

Despite the protocol's apparent inability to accurately measure trends, it yielded the highest rates of induced abortion for the two most recent years covered by the survey. Despite the well-known advantages of DSS and DHS surveys for collecting general reproductive health data, alternative research strategies are necessary to investigate highly sensitive topics. The specific abortion focus of the AFS; the presurvey, qualitative research component; the relatively unstructured format of the instrument; and the extensive probing that use of the calendar allowed all yielded higher rates of induced abortion than the more general DSS and MDHS surveys.

With the protocol of merging quantitative and qualitative research, investigators can collect a wide range of data from large samples at a reasonable cost. The AFS yielded qualitative information about the "process" of abortion, including cultural perceptions of abortion, household decision making on pregnancy termination, and information about abortion procedures—including MRs—and providers and their effectiveness. It also appears to be an improvement over standard sample surveys in generating realistic, quantitative measures of induced abortion, at least in the two years immediately before the year of the interview.

Part II. The Narrative Survey Approach: An Experiment in Madhya Pradesh, India

Jeffrey Edmeades, Laura Nyblade and Erin Pearson

This section reports on a novel project carried out by researchers at the International Center for Research on Women (ICRW)* who developed and fielded a survey measuring abortion and reproductive behavior based on a "narrative" approach. Like the AFS, this methodology uses a mixed approach to strengthen overall data quality; however, the "narrative" survey technique combines in one instrument the strengths of both quantitative and qualitative methods.

Application of the Narrative Approach

The methodology was developed and implemented as part of a study that was fielded in 2002 in Madhya Pradesh, India, to gather information on abortion and other reproductive events. In addition to improving the reporting of abortion incidence, the study sought to capture more detailed and nuanced information about the contextual factors surrounding pregnancy and pregnancy termination. A sample of 2,444 married women aged 15–39 with at least one child were interviewed, meaning that the sample was broadly representative of women in their prime childbearing years who had childbearing experience.

Restricting the sample to this age-range addressed concerns about potential recall bias among older women (as these women would be describing events that took place well in the past). Including only women who had already had a child ensured a sufficient number of pregnancies; women without children would likely have both fewer pregnancies to report and a much lower likelihood of having attempted an abortion. The resulting cross-sectional data set captures each event in the reproductive lives of the 2,444 respondents, encompassing 9,127 pregnancies with a known outcome and 11,341 pregnancy intervals. (See Edmeades et al. 2010 for more detailed information on the study, sampling and results.)

Development of the final "narrative" survey instrument included multiple steps. The first step was entirely qualitative, involving the use of focus groups; key informant interviews; and in-depth interviews with women, their family members, community members and service providers. In addition to establishing the specific topic areas to include in the survey, this first step confirmed the utility of using a narrative approach in which women are encouraged to provide abortion information as part of a larger "story" of their life.

The second step involved developing and pilot-testing the actual survey instrument (ICRW, 2002). While broadly similar to most survey instruments, the narrative-approach instrument was explicitly designed to mimic the pattern of the narratives women used to describe their reproductive lives. This was done by structuring the questionnaire and response matrices to collect information in a natural conversational flow rather than through closed-ended questions (see Edmeades et al. 2010 for an example of the flow of the questions). As was the case in the qualitative phase, allowing women to "tell their story" in the quantitative portion helped overcome some of the barriers associated with asking questions on abortion. To further facilitate this process, the instrument was administered in two separate sessions, so the interviewer had time to establish rapport before approaching sensitive topics. Dividing the interview into two sessions also allowed the respondent to select the time that would be most convenient for the second session. Having the respondent schedule the second interview allowed her to take

*This research was conducted in collaboration with the International Institute for Population Studies, Mumbai and the Government Medical College, Nagpur.

into account when privacy could be assured during her daily activities. Interviewers were instructed to interview women only when privacy could be reasonably assured. The instrument was piloted to test the transferability of the narrative approach to a survey structure, the reliability of the instrument and the logistical feasibility of the two-day interview approach.

The instrument was designed to collect basic background information on women and their individual pregnancies and life experiences. To accomplish all this without breaking the intimate connection established by the narrative method or exhausting the patience of the respondent, the first-day session took a traditional interviewing approach and focused largely on the characteristics of the woman and her household. General questions about abortion knowledge, opinions and practice were asked in this session, which concluded with a preliminary pregnancy history. In taking that history, interviewers first asked about the births of two successive children to serve as an anchor for probing about any additional pregnancies between births. With this line of questioning, the complete pregnancy history of the respondent could be mapped out before the second session.

The complete pregnancy history from the first session served as the basis for the second session, which collected detailed information on each pregnancy. As part of the narrative approach, women were asked a range of questions about their family, social situation and actions during each pregnancy "interval," or context time frame, beginning with the interval between marriage and the first pregnancy. Once a pregnancy is recorded, follow-up questions address the full experience of the pregnancy and its outcome (live birth/stillbirth, miscarriage or induced abortion). For example, for each pregnancy, women were probed about whether they had wanted to terminate it and whether they had acted on that desire. If a woman reported such feelings or actions, follow-up questions were asked about the full situation and resolution (live birth/stillbirth, miscarriage, unsuccessful abortion attempt and successful abortion attempt). If an abortion was attempted, a series of questions were asked that were specific to each attempt (see Edmeades et al. 2010). On average, the first interview session took 30 minutes and the second one took 90 minutes.

The training of field interviewers was essential to the successful implementation of this methodology, particularly given the use of a nontraditional instrument and approach. One of the most important objectives of the training was to give interviewers the confidence to implement the survey effectively, since doing so required flexibility along with consistency and rigor in recording responses. The training involved both ensuring that interviewers had a complete understanding of the subject and related issues, and that they had the tools to conduct interviews of this type. Training on rapport-building techniques was key to enabling interviewers to broach the highly sensitive behaviors asked about. Familiarity with such techniques allowed interviewers to gather full information on the woman's families, explain the purpose of the study, and emphasize the importance of having the woman's "gatekeepers" (e.g., husbands or mother-in-laws) support her participation.

The training involved an intensive two-week course that was conducted by the principal investigators. The course was structured around participatory principles that allowed interviewers to suggest modifications to the instrument. A detailed training manual was also developed by the research team to provide an ongoing resource for the interviewers.

Assessment of the Narrative Approach

The narrative approach is designed to both reduce the underreporting of abortions and collect detailed contextual data on the circumstances of abortion attempts. The approach generates abortion prevalence (the proportion of women who have ever had an abortion over their reproductive life course) rather than annual rates (number of abortions each year per 1,000 women of reproductive age), so comparing its results against official abortions rates is problematic.* Comparing the more readily available abortion ratios (abortions per 100 births) shows that the narrative technique applied in Madhya Pradesh consistently captured more abortions than did the traditional, face-to-face National Family Health Survey (NFHS-2) conducted at roughly the same time. For example, the ratios derived from the narrative approach are roughly five times those derived from the NFHS-2 across both urban and rural areas (i.e., the NFHS-2 ratios were 2.8, 0.7 and 1.2 among urban, rural and all women respectively, compared with ratios generated by the narrative approach of 10.0, 4.4. and 5.5 respectively) (Malhotra et al. 2003).†

A further benefit of the narrative approach is the depth of contextual data that can be gathered using this approach relative to traditional surveys. The narrative approach encourages women to contextualize their pregnancy experiences in terms of other life experiences, including their relationships with family members and household situations.

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*Currently, no standard widely accepted approach exists for converting prevalence into rates. In this manual, however, researchers have proposed an approach for doing so; see Chapters 8 and 9.

†In order to ensure comparable samples, the NFHS-2 data for Madhya Pradesh were first restricted to the equivalent group of women (married women aged 15–39 with at least one child) and the data from this subgroup were then used to calculate abortion ratios.

The exceptionally wide range of experiences encompassed by the questions provides considerably more information on the factors influencing abortion than would be possible using surveys that are less focused on abortion.

For example, the narrative approach collected women's reasons for attempting an abortion; whether they consulted anyone about it and, if so, whom and what advice they received; what they eventually decided to do; and the gestational age of the pregnancy at the time of the decision. If a woman attempted to terminate a pregnancy herself, she was asked what she did, where the attempt was made and whether she was helped in any way. Women whose attempts involved a provider were asked a series of questions about the type of provider, the advice/service received (including information on actual procedures and requirements for service), the cost of the procedure/medication, and how much family support the woman had for her decision. Finally, the approach also contained a series of questions that measured side effects from abortion attempts in terms of medical symptoms (excessive bleeding, infection, etc.) and in terms of limitations on daily activities (days of bed rest required).

Discussion

Collecting accurate data on abortion incidence is extremely difficult, particularly in settings where women have relatively little control over their reproductive behavior and where cultural norms strongly discourage abortion. The narrative approach described here provides a further tool that researchers can use to explore this issue. However, the approach does require significant investments: Among the approach's limitations are the time and expense needed for the special training of interviewers and for close field supervision. A narrative survey may also take more time to administer in the field than standard DHS-type surveys because of the two-visit approach and the time needed for rapport-building at community and household levels. (Overall, however, the time required was comparable to that needed for other surveys.). Finally, the wide range of sensitive data collected, which includes women's experience of domestic violence and their perceptions of the quality of their relationships, means that special care must be taken to ensure the confidentiality of women's responses.

Despite the limitations to this approach, the results suggest that it has a number of advantages over standard direct surveys. The mixed-method approach allowed for in-depth information to be collected while still applying a rigorous sampling strategy (Edmeades et al. 2010). That strategy resulted in a more representative sample than is typically the case in surveys that ask about abortion, which often rely on provider-based populations. The narrative technique also enabled complex statistical analyses of the determinants of both abortion and abortion-related morbidity. In sum, the collection of data using this approach allowed for a much deeper contextualization of abortion behavior and experiences than is typical with quantitative surveys, and provided a sound basis for empirical research.

Part III. The Detailed Abortion Module: The Example of Eastern Europe

Florina Serbanescu and Paul Stupp

Official statistics on induced abortion are kept for all countries in Eastern Europe,* where abortion has long been legal, readily available and widely used. Abortion rates (and ratios) in many of these countries have been among the highest in the world, often surpassing fertility rates (Henshaw et al. 1999; Sedgh et al. 2007). Since the 1990s, abortion is legal without restrictions as to reason during the first 12–14 weeks of gestation in all countries but Poland (Rahman et al. 1998). Although the procedure is affordable and relatively accessible in most countries, some women still seek abortions outside designated health services. Lengthy waiting times, unsanitary conditions, a lack of privacy and confidentiality, extra fees, mandatory notifications to employers or primary care physicians, parental consent requirements and advanced gestational age (beyond 12–14 weeks) all have been cited as common deterrents to obtaining safe, legal abortions (Serbanescu and Morris 2003).

When these countries were controlled by the Soviet Union, health and population data were unreliably reported: "Unfavorable statistics," which could trigger disciplinary actions, were underreported and "positive" results, which could bring rewards, were overreported. The profound health-system changes that occurred during the post-Soviet economic transition led to other data problems, such as those caused by the failure to record or report abortions in underfunded state-run health facilities; the expansion of the private health sector, whose activities are usually not included in official statistics; and an overall decline in monitoring and evaluation of health activities (Serbanescu and Morris 2003). Further, the continued practice of performing abortions beyond the legally permitted gestation (usually 12–14 weeks), usually outside

*The region of "Eastern Europe" has many definitions; most are based on geographic and political considerations. Generally, countries located between Central Europe and the Ural Mountains that have postcommunist regimes and similar socioeconomic systems are considered part of Eastern Europe. Reproductive Health Surveys (with assistance from the CDC) that have detailed abortion histories were conduted in Albania, Azerbaijan, the Czech Republic, Georgia, Moldova, Romania, Russia and Ukraine.

clinical settings, adds to the underreporting of abortions. In some settings, such as the South Caucasus region, decreases in population through conflict, territory loss, and internal and external migration means that obsolete population projections are far higher than reality; such inaccurately inflated denominators will yield underestimates of population-based health measures, including general abortion rates (Serbanescu and Morris 2003).

Thus, in countries where abortion is legal but reliable official health statistics are lacking, measuring incidence based on retrospective self-reports in surveys is often a more accurate alternative. Despite some inherent limitations and a certain degree of sampling error, survey-based measurements in Eastern Europe generally provide a better estimate of abortion incidence than do official reports. Survey data also have the added benefit of placing abortion research within a broader context of social and reproductive health behaviors, such as fertility and union dynamics, demand for contraceptive methods and unmet need for family planning. Although social stigma normally associated with self-reports of abortion is less strong in these countries than elsewhere, cross-sectional surveys still suffer from other biases, such as omissions, misclassification of abortions that are obtained outside the legal system, and poor recall of events that occurred long before the survey date.

Development of the Abortion Module

One way to improve the collection of abortion data in settings where the procedure is legal but official underreporting is extensive, is to incorporate an abortion module into a DHS-like survey. The Reproductive Health Surveys (RHS), which were launched in the mid-1970s, were developed by the Division of Reproductive Health of the U.S. Centers for Disease Control and Prevention (CDC) to collect detailed country-specific reproductive, maternal and child health data (Morris 2000). The RHS surveys are nationally representative, probability-sample household surveys that collect information on a wide range of health-related topics from women of reproductive age.

The surveys are organized around a set of standard core modules that offer the consistency needed for international comparisons of health indicators. These modules can be expanded to meet local needs and additional modules can be added to accommodate country-specific objectives. The abortion module, which was specifically designed to capture details on unintended pregnancy and pregnancy termination in Eastern Europe, explores women's lifetime and recent abortion experiences.

The module contains questions that prompt each respondent to report a complete lifetime pregnancy history, which includes information on each pregnancy outcome (i.e., live birth, stillbirth, miscarriage or abortion) in reverse chronological order. For abortions, each respondent is asked the date of the pregnancy termination; for live births, she is asked about the sex and survivorship of each child. Information on the intendedness of each pregnancy at the time of conception is collected for all pregnancies completed in the five years immediately before the survey. For each induced abortion in the those five years, the following additional data are collected: reasons for the abortion, partner's attitudes toward it, use of contraceptives at the time of conception, details related to the abortion procedure and care received, experience of early and late postabortion complications, and receipt of postabortion counseling and contraceptive methods.

In developing the abortion module, the following eight basic parameters were applied:

1) Sequencing—a balance of just enough questions preceding the abortion questions to build rapport and increase the likelihood of disclosure, but not too many to cause interview fatigue.

2) Phrasing—short questions use unequivocal and local terminology and lay equivalents of medical terms, and the instrument is pilot-tested prior to finalizing the survey questionnaire.

3) Multiple topics—questions are asked on numerous reproductive health and women's health aspects to reduce the sensitivity surrounding one particular issue.

4). Complete lifetime pregnancy histories—needed to improve respondents' recall and to ensure as complete reporting of all pregnancy outcomes as possible. Outcome details are collected in reverse chronological order, starting with the most recent pregnancy and asking about the next-to-last, second-to-last and so on. To avoid any initial underreporting of the total number of abortions, and women deliberately omitting pregnancies to conform to that number, respondents are never asked to report an aggregate number of pregnancies that ended in a specific outcome (Jones and Forrest 1992).

5) Direct questioning on all abortion events in the past five years—this captures data on every pregnancy, starting with the type of outcome and duration of gestation, and ending with pregnancy intendedness (for recent pregnancies). Information is collected on induced abortions and "mini-abortions," which refer to abortions by vacuum aspiration during the first six weeks of pregnancy. These types of abortion are fairly common in the successor countries of the former USSR (David 1999).

6) Repetition—abortion-related questions are asked more than once to give women more opportunities to disclose their experiences. Although complete pregnancy histories are taken, respondents are prompted to report

again on their most recent pregnancy outcomes.

7) Use of month-by-month calendar histories—used to ask about contraception, pregnancy status and other events during a fixed period (usually five years) prior to the survey, proceeding backward from the time of the interview. Coded information is recorded for each month in the reference period. The approach of recording pregnancy and contraceptive histories in one place increases the recall of reproductive health events and their timing, allows for internal checks of consistency and provides a visual tool to help clarify inconsistencies (Wingo et al. 1988; Becker and Sosa 1992; Magnani et al. 1996).

8) High-quality interviewers—careful selection and extensive training of female interviewers to assure that they understand the subject matter and the conceptual issues of survey research.

The face-to-face interviews conducted in the RHS surveys are anonymous, confidential and voluntary. No direct individual identifiers are recorded on the questionnaire, and information on the address of the household is dropped prior to data entry. Informed consent is obtained by providing the potential respondent with a detailed description of the purpose of the study and its protocol, including the measures to ensure anonymity and confidentiality. The woman is told the duration of the interview and that her participation is voluntary and can be discontinued at any time. Barriers to answering questions on socially sensitive topics are addressed through assurances of confidentiality, reassurances that all answers are acceptable, and encouragement to disclose personal views and experiences.

Because survey activities on health topics are relatively new in Eastern Europe, most respondents welcome the opportunity to participate. Overall response rates are very high, ranging from 85% in Ukraine (generally considered a threshold for an acceptable nonresponse bias) to over 98% in Georgia. The level of specific item nonresponse (i.e., refusals and "do not know/do not remember") is also remarkably low. For most of the health variables and indicators, including answers related to experience and attitudes toward induced abortion, nonresponse is below 2%.

Assessment of the Abortion Module

Calculating the incidence of induced abortion through self-reports is hampered by uncertainties that are difficult to overcome and often impossible to measure. The best way to determine completeness of self-reports is to use external sources to validate these responses. However, validation of survey-based abortion levels through comparisons with national, official statistics has proved unworkable in Eastern Europe, since the official records are so unreliable. The RHS surveys in Eastern Europe have estimated abortion rates that exceed the official figures, sometimes by a considerable margin (Figure 2; note the data for Armenia in 2000 comes from a DHS). Without reliable national data, there are few other options for estimating the level of completeness of abortion reporting in population-based surveys.

The most conclusive validation of women's self-reports—comparing them with their individual medical records—requires expensive special studies that are often small-scale. Few studies of this type have been conducted worldwide. U.S. studies have shown that the extent of women's underreporting varies with age, race and socioeconomic status (Udry et al. 1996; Jagannathan 2001). The only such study conducted in Eastern Europe used a sample of women who obtained abortions in a maternity hospital in Tallinn, Estonia, during 1991 (Anderson et al. 1994). For these women, who were followed-up by a household interview the following year, the numbers of lifetime abortions reported in the face-to-face interview agreed with their medical records in 88% of cases. The study also found that Estonian women of Russian ethnic descent, married women, those with higher educational attainment and those younger than 40 were more likely than others to self-report an abortion.

When conventional data sources for comparisons are unavailable or inadequate and resources are limited, external validation can be done using other health surveys based on the same population. An alternative source of nationally representative, population-based data on abortion in Eastern Europe is provided by the DHS surveys conducted in the region.* There are important differences between the RHS and the DHS surveys in both content and sampling. While the RHS surveys use the methodology described in detail above, the DHS surveys use a series of filters—asking respondents to provide the total number of pregnancies that ended in live births, abortions, stillbirths or miscarriages. Only respondents with one or more completed pregnancies are asked to recall details about their pregnancy histories. Further, in DHS surveys, neither the filters nor the pregnancy history questions are designed to prompt women to report on their experience of "mini-abortions." The pregnancy events in the DHS questionnaire are entered in the five-year calendar of pregnancy and contraceptive use at the time of completing the pregnancy history; any recent contraceptive use is added later in the calendar in the intervals between months

*Between 1993 and 2005, DHS surveys were conducted in Armenia, Azerbaijan, Moldova, Turkey and Ukraine; thus, comparable DHS data are available for the RHS countries of Azerbaijan, Moldova and Ukraine.

spent pregnant.

The surveys also differ by sampling approach. In the RHS sampling design, only one respondent is selected per household—using a randomization table included in the household questionnaire—while in the DHS, all women of reproductive age in the household are interviewed. The confidentiality of the topics addressed in the questionnaire, and women's willingness to answer sensitive abortion questions, are likely to be lower in households where all eligible respondents are interviewed.

Although the true abortion rates in many countries in Eastern Europe are not known, the DHS approach may have contributed to underreporting in recent DHS surveys conducted in Moldova, Azerbaijan and Ukraine. These DHS surveys followed RHS surveys that were conducted 5–8 years earlier. For example, the DHS-derived, more recent total abortion rates among woman aged 15–44 are all lower than the RHS-derived ones, without corresponding increases in contraception or fertility to justify the decline. Specifically, the total abortion rates from the earlier RHS and later DHS in these three countries are 1.6 lifetime abortions vs. 0.4 in Ukraine (Ukrainian Center for Social Reforms 2008); 3.2 vs. 2.3 in Azerbaijan (Azerbaijan State Statistical Committee 2008); and 1.3 (Moldovan Ministry of Health 1998) vs. 1.1 in Moldova (Moldovan National Scientific and Applied Center for Preventive Medicine 2006).

Even though independent comparable studies are scarce, consistency of reporting on abortion may be examined by comparing abortion rates for the same cohorts of women in successive surveys. In Romania and Georgia, for example, where two RHS surveys were conducted five years apart, the abortion rate for a given cohort in the period 5–9 years before the most recent cycle of the survey was within confidence intervals of that cohort's abortion rate in the period 0–4 years before the earlier cycle.

Discussion

Alternative strategies to accurately measure abortion are needed in the absence of a functional health information system, as is the case throughout Eastern Europe. The abortion module added to RHS surveys in the region has greatly increased our understanding of abortion levels, context, determinants and provision. However, more research is still needed in questionnaire development to further improve the validity and reliability of responses. Several questionnaire-design approaches seem promising and worth trying, such as incorporating multiple, related questions on the practice of abortion in several sections of the questionnaire, and adding qualitative components with a focus on exploring key decision-making processes in a woman's abortion history.

Reproductive health household surveys with representative samples remain essential tools in documenting a variety of behaviors that can be inferred with a measurable level of certainty to apply to the population as a whole. While there are limits to the reliability of self-reported abortions in certain settings, the module used in the RHS surveys in Eastern Europe provides a quick and affordable way to obtain more complete data on induced abortion than routine health information systems provide. The module's findings have been instrumental to the study of induced abortion in Eastern Europe. They helped project the need for family planning services; served as sources for reproductive health indicators used in program design, monitoring and evaluation; shed light on correlates between these indicators and contextual factors; increased public awareness of abortion; fostered collaborations between stakeholders to improve reproductive health; and promoted relevant policy changes.

Chapter Conclusions

The three approaches to face-to-face interviews presented in this chapter represent modifications to traditional survey instruments to better reflect the special requirements of documenting the incidence of abortion. The AFS, which involves first conducting qualitative research to understand the local context and language used to describe abortion, uses a quantitative, comprehensive reproductive events calendar. Reproductive histories are obtained through a face-to-face interview that allows the interviewer to probe when inconsistencies arise.

The "narrative" survey technique also includes qualitative and quantitative components, albeit in one data collection instrument, as a way to overcome women's reluctance to share sensitive information about abortion. The interviews span two days. The first day is used to build rapport, and obtain general household information and a clear understanding of the cultural context of abortion. The interview on the second day includes having the woman narrate her reproductive life "story" anchored by pregnancies. When a pregnancy is recorded, the interviewer follows up with further questions.

The final modification to face-to-face surveys presented in this chapter is the inclusion of a detailed abortion module, which has been used in the RHS surveys conducted by the CDC. The module asks respondents detailed questions about pregnancies that ended in induced abortion and has elicited high response rates, perhaps because there is little social stigma associated with abortion in the region where it was implemented, Eastern Europe.

The AFS and "narrative" technique documented higher rates of abortion than those reported in large-scale, population-based surveys, and the module added to the

RHS surveys in Eastern Europe revealed higher abortion rates than those reported in the countries' national health statistics. These overall findings suggest that the three modifications provide estimates that are closer to the true incidence of abortion. Possible drawbacks of these approaches are that both the AFS and the "narrative" methods require extensive training of interviewers to ensure that they are able to implement the survey correctly and recognize when a woman is talking about an induced abortion. The interview process can also be time-consuming, especially with the "narrative" survey, which includes two days of interviews for each participant. Even though the abortion module used in RHS surveys measured the incidence of abortion more reliably than other similar sample surveys and official statistics, its success was likely greatly influenced by the special conditions in Eastern Europe that are favorable to abortion reporting.

In sum, despite the possible disadvantages, these modifications to face-to-face surveys that are tailored to extract abortion histories appear to provide a more accurate portrait of the incidence of abortion. The AFS and "narrative" techniques should be considered as options in settings where sensitivity surrounding the topic of abortion is high and abortion services are accessed outside the formal health care sector. The abortion module appears to be especially useful in settings where stigma surrounding abortion is weak and health information systems are unreliable.

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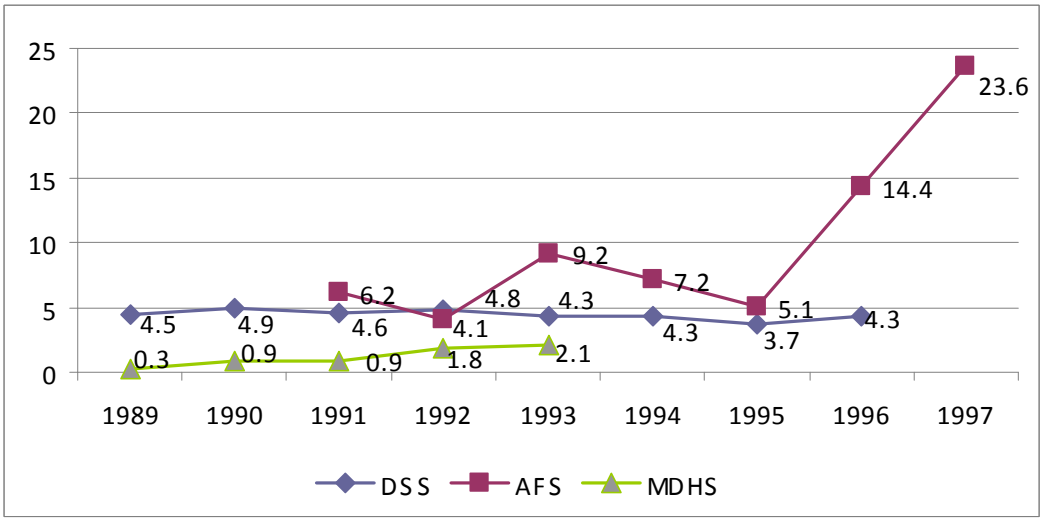
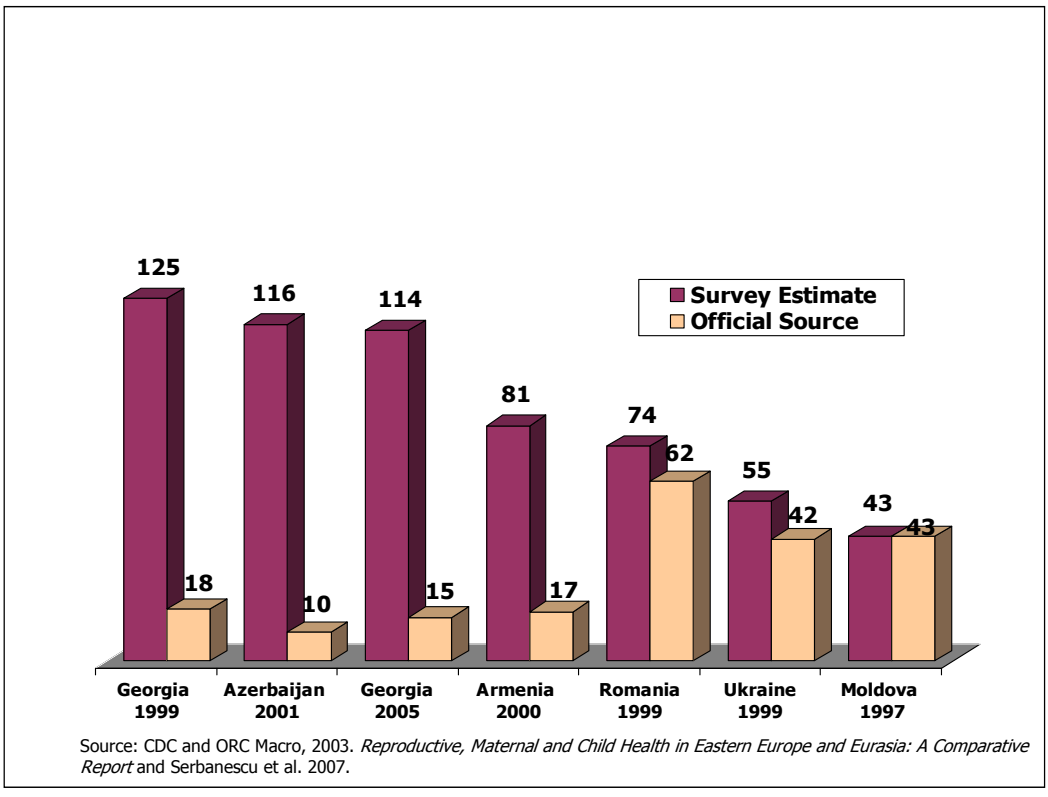
FIGURE 1. Direct estimates of annual rates of induced abortion per 1,000 women accroding to survey, Matlab, Bangladesh, 1989–1997



Source: Johnston 1999

FIGURE 2. General abortion rates (per 1,000 women) in Eastern Europe, survey estimates and governmental sources



Source: CDC and ORC Macro, 2003. *Reproductive, Maternal and Child Health in Eastern Europe and Eurasia: A Comparative Report* and Serbanescu et al. 2007.

CHAPTER 4

Examples of Model-Based Approaches To Estimating Abortion

Heidi Bart Johnston and Charles Westoff (Coordinator: Lisa Remez)

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Disagreement between contraceptive prevalence and fertility often leads researchers and policymakers to assume that abortion is being used as a method of fertility regulation. But even if abortion is likely contributing to fertility decline, the data to accurately describe and quantify that contribution are usually missing and thus need to be indirectly estimated. Model-based estimation techniques are inherently appealing because they make use of the expected relationships between abortion and existing, widely available data on other determinants of fertility. Of course, these model-based techniques are highly dependent on the quality of the input data and on whether measures of all possible fertility-influencing factors are available and included. Because of limitations on input factors, models provide, at best, an approximation of actual abortion rates. Nonetheless, they can be invaluable in providing rough estimates of abortion where sources of abortion data are sorely lacking or highly unreliable.

This chapter discusses two model-based approaches. In Part I, Heidi Johnston presents the residual estimation method that rearranges the standard order of the four principal proximate determinants of fertility in Bongaarts's model to produce an abortion index, which is then converted to an abortion rate. The method's clear advantage is not having to conduct new research on the highly sensitive topic of abortion; instead, it uses the readily available input variables of standard measures from demographic and health surveys. The "residual method" has yielded mixed results, as it is highly dependent on the quality of the data and is very sensitive to error on input variables.

Charles Westoff then presents a methodological exercise that is based on the assumption that the high correlation between modern contraceptive use and the total abortion rate (TAR) supports use of a regression equation to predict abortion incidence. If we accept that abortion is the result of the interaction between contraceptive (modern) prevalence among married women and total fertility, then a regression equation to predict TARs can be set up with easily obtainable data. The simplified equation seems to fit developed countries better than developing countries, because additional factors (such as traditional method use, unmet need for contraception, education, urban-rural residence, sexual activity and contraceptive use among unmarried women etc.) likely have a stronger and more variable impact on abortion in developing countries than in developed ones.

Part I. The Residual Technique

Heidi Bart Johnston

Where high-quality data on the proximate determinants of fertility are available, the residual method may provide an easily implementable technique to indirectly estimate rates of induced abortion. Given the inaccuracy of abortion data in many areas of the world, the residual estimation technique, though not perfect, may provide estimates that are both easier to generate and more accurate than existing ones. However, as described below, the sensitivity of the technique to data error limits its applicability.

What Is the Residual Technique?

The residual estimation technique is derived from the proximate determinants model of fertility, which is based on the concept that all socioeconomic, cultural and biological variables that influence fertility work through a limited number of factors called the proximate determinants of fertility. This model, originally put forward by Davis and Blake in the mid-1950s (Davis and Blake 1956), was further developed by others, including Bongaarts and Potter (Bongaarts 1982; Bongaarts and Potter 1983). The seven factors generally regarded as the proximate determinants of fertility are 1) proportion of females married or in sexual unions; 2) contraceptive use and effectiveness; 3) prevalence of induced abortion; 4) duration of postpartum insusceptibility; 5) fecundability; 6) spontaneous intrauterine mortality; and 7) prevalence of permanent sterility.

In an analysis of 41 populations—which included samples in the developed and developing world as well as historical populations—Bongaarts and Potter (1983) determined that marriage, contraception, abortion and postpartum insusceptibility explained 96% of the varia-

tion in measured fertility. These four factors are called the principal proximate determinants of fertility. The small remaining amount of unexplained fertility results, in part, from the three minor proximate determinants of fertility—namely, fecundability, sterility and intrauterine mortality—which are thought to not vary much across countries or over time.

In the proximate determinants of fertility model, the total fertility rate (TFR) is estimated as the average total fecundity rate (TF) reduced by indices that represent the fertility-reducing effects of each of the four principal proximate determinants:

$$TFR = T_F * C_M * C_C * C_A * C_I$$

where

TFR is the average total number of births per woman at the end of her reproductive years, if current age-specific fertility rates prevail throughout those years;

TF is the average maximum potential number of births throughout the reproductive years, which is set at 15.3 births per woman;

C_M is the index for births averted by delayed exposure to sexual intercourse;

C_C is the index for births averted by use of contraception;

C_A is the index for births averted by induced abortion; and

C_I is the index for births averted by postpartum insusceptibility.

The indices generated have values ranging from 0 to 1. An index with a low value indicates that the determinant has a strong fertility-inhibiting effect; an index with a high value implies the determinant has a minimal fertility-inhibiting effect. So an index with a value of 0 suggests all fertility is prevented by the particular behavior, and an index with a value of 1 suggests that the represented behavior causes no reduction in fertility.

By rearranging the proximate determinants of fertility model, the index of abortion can be calculated as a residual, whereby $C_A = TFR / (TF * C_M * C_C * C_I)$. The fertility-reducing effects of abortion are thus represented as an abortion index (Table 1, see all tables, figures and appendices at the end of the chapter). As with the indices designating the other principal proximate determinants of fertility, the index of abortion should have a value ranging from 0 to 1. However, with real data, a residual estimate of the index could exceed 1.

Two major sources of error could influence the residual estimates. The first is error in the data that are needed to generate the indices representing the fertility-reducing effects of the principal proximate determinants. The second is error from neglecting to account for the effects of the minor proximate determinants in the model. If fecundability, sterility or intrauterine mortality has a strong and varying influence on fertility, the effect of the influential determinant or determinants should be included in the model as a variable. The value of TF, the average total fecundity rate of a population in the absence of any fertility-reducing effects of the principal proximate determinants, would also have to be adjusted accordingly. However, Johnston and Hill (1996) demonstrated that these minor proximate determinants do not have a consistent effect on the residual estimate. TF has been estimated at 15.3 lifetime births, but is expected to vary from 13 to 17, depending on the effects of the minor proximate determinants. Furthermore, residual methods of estimation are extremely sensitive to over- or underestimation of contributing values. Data error or absence of influential determinants of fertility could strongly influence the accuracy of the resulting abortion estimate.

Estimates of induced abortion generated from the residual method are presented in multiple forms—as a fertility-reducing index (C_A); an abortion rate per 1,000 women per year; and a TAR, which is similar to the total fertility rate, as it represents the number of abortions an average woman would have if she had abortions at the current rate throughout her reproductive lifetime. The abortion index can be used to calculate the TAR using the equation originally presented by Bongaarts and Potter but rearranged, whereby $TAR = ((TFR/ C_A) – TFR) / (0.4*(1+u))$. The TAR can then be translated into a rate per 1,000 women by dividing by 35 (average number of reproductive years per woman) and multiplying by 1,000.

Application of the Residual Technique to Data from Matlab, Bangladesh

The residual technique of estimating abortion was tested with data from Matlab, a rural area of Bangladesh, where the resulting estimates could be compared with multiple direct and indirect estimates. ICDDR,B, an international public health research institution based in Dhaka, Bangladesh, maintains a demographic surveillance program in Matlab that covers a population of about 200,000. The Matlab surveillance program is divided into a maternal child health–family planning (MCH–FP) area where intensive interventions take place, and a comparison area where the level of family planning activity is comparable to that in other areas of rural Bangladesh.

ICDDR,B's Demographic Surveillance System (DSS) and Record Keeping System (RKS) include abortion data for both the direct estimation of abortion rates and for the proximate determinants of fertility that are needed for indirect residual estimation. In addition, a survey that followed the Demographic and Health Survey (DHS) template was conducted in Matlab in 1994 (MDHS; N=3,225) to validate results from the 1993–1994 national-level Bangladesh DHS. The MDHS contains data to generate both direct and indirect abortion estimates. Two additional estimates of abortion were available for roughly the same time period, including indirect estimates generated by the Abortion Incidence Complications Method (Singh et al. 1997) and direct estimates from an abortion-focused household survey (Abortion Frequency Survey, or AFS) conducted in Matlab in 1996–1997 (Johnston 1999).

Residual Estimates of Induced Abortion for Matlab

Induced abortion estimates were calculated by applying the residual technique with the following three data sources: 1994 MDHS data, 1994 DSS data and 1996 DSS data. For each data set, an estimate is presented for the entire ICDDR,B Matlab study area, the MCH–FP area of the Matlab study area and the comparison area.

Table 2 compares residual estimates of TARs with direct and indirect estimates. Specifically, when the1996 residual TARs for the MCH–FP and comparison areas and for the total Matlab area are compared with direct estimates from the 1997 AFS, the residual technique yields similar results. For the total area, the 1996 DSS residual TAR of 0.77 is remarkably similar to the direct 1997 TAR of 0.83. Likewise, for the comparison area, the residual TAR of 1.46 agrees favorably with the direct estimate of 1.39. However, for the MCH–FP area, the residual TAR of 0.07 is less similar to the direct estimate of 0.34.

In contrast, the residual results using the 1994 MDHS data set were not as good a fit: The residual 1994 MDHS estimates are 2–4 times higher than the direct 1997 TAR estimates. The residual TAR estimates based on the 1994 DSS, however, are somewhat closer to the direct 1997 estimates, though the negative TAR for the MCH–FP area is obviously off the mark.*

Using indirect estimates based on hospitalized postabortion complications, Singh et al. (1997) reported 1995 annual abortion rates that are very similar to the direct rates derived from the 1997 AFS (Johnston 1999) and to the residual estimates based on DSS 1996 data. According to Singh and colleagues, national-level annual abortion rates for this predominantly rural country were 26–30 abortions per 1,000 women in 1995; this compares favorably to the residual estimate of 22 abortions per 1,000 women in the total Matlab study area based on the 1996 DSS. Because of the intensive family planning program in the Matlab MCH–FP area, the abortion rate is expected to be lower in that area than in all of Bangladesh, and indeed residual estimation bears this out. The comparison area estimate of 42 abortions per 1,000 women per year is in line with Singh and colleagues' estimate of the abortion rate in the Dhaka Division of 38–42 abortions per 1,000 women per year.

Sensitivity of the Residual Estimation Technique

The residual technique of abortion rate estimation is extremely sensitive to inaccurate data. To demonstrate the sensitivity of the method to inaccurate data inputs, the DSS data to generate each index and TFR were varied upward and downward in proportions ranging from –25% to +25% (see Table 3). The sensitivity analysis shows that a 5% *decrease* in contraceptive prevalence causes the abortion index to fall from 0.86 to 0.81, which translates to an *increase* in the TAR from 0.77 lifetime abortions per woman to 1.12. A 5% *increase* in contraceptive prevalence causes the abortion index to increase to 0.92, which translates to a decrease in the TAR from 0.77 to 0.43. Thus, underestimating contraceptive prevalence by 5% overestimates the TAR by a factor of 1.45. Overestimating contraceptive prevalence by 5% yields a 44% underestimation of the TAR.

Given this sensitivity, the residual technique is particularly susceptible to error in the input data. Thus, considering the likely inaccuracy of the MDHS estimates of modern contraceptive use (i.e., they are 14% lower than the DSS estimates for the same population covering the same time period) and of the MDHS estimates for the TFR in Matlab as a whole (which are 5% higher than the DSS rates), applying the residual technique with MDHS data is problematic.

Part II. A Regression Equation Approach to the Estimation of Abortion Rates

Charles Westoff

The difficulties in estimating abortion rates are widely known. For various reasons, abortion rates are probably the most inaccurate of all demographic measures. The controversial nature of abortion affects not only the reluctance of many women to report the event but also the position of governments toward maintaining reliable registration systems.

*Even if the 1994 DSS residual estimates for the comparison area are within the same basic range, that they were *higher* than the direct 1997 estimates seems implausible, since it is unlikely that the TAR could have decreased over time (from 1.9 based on the 1994 DSS to 1.4 based on the 1997 AFS), as desired family size was decreasing and contraceptive prevalence was relatively low.

The following is a summary of the work recently published in a DHS Analytical Study (Westoff 2008), which was based on a paper originally presented at the IUSSP seminar on measuring abortion. The objective is to briefly describe the research underlying the estimation procedure and provide a useful and simple model to estimate TARs in developing countries. The account here is based entirely on the published DHS Analytical Study.

Logic of the Approach

The basis of the regression approach is the observed extremely strong association between contraceptive prevalence rates and the number of lifetime abortions per woman (Marston and Cleland 2003; Westoff 2005). The very high correlation (.95) between the use of modern methods and abortion is based on 59 data sets from 44 countries (Appendix A), predominently developed with some Asian and South American countries where some confidence can be placed on the accuracy of the basic information (Figure 1).

This association depends entirely on the use of modern methods of contraception. The direction of the relationship between abortion and contraception reverses with traditional methods (withdrawal and rhythm), whose greater use is connected with higher abortion rates, no doubt because of traditional methods' higher failure rates (Figure 2).

The challenge in this effort is to extend this approach to the least developed countries where there is no "gold standard" to evaluate estimates. The effort has involved a considerable amount of experimentation and the interested reader should refer to the full DHS report.

The other main variable added to the prediction equation is the TFR. Thus, abortion is viewed as the result of the interaction of the proportion using contraception (primarily modern methods) and the fertility rate. The final equation to estimate the TAR based on 67 observations from 51 countries (Appendix B) is:

$$TAR = 3.63 - .033(MOD) + .009(TRAD) - .333(TFR)$$

where MOD is the percentage of currently married women using a modern method of contraception; TRAD is the percentage using a traditional method; and TFR is the number of births a woman would have over her lifetime assuming current fertility rates remains stable.

Obviously, this does not imply that other factors are not relevant to the abortion rate. In the full report, we examine the importance of income, education and other measures that increase the predictive validity of the equation but which are not universally available.

Results and Comparisons with Other Estimates

Estimates of TARs for 34 less developed countries from the above equation are shown in Table 4. The overall average for these countries is a TAR of 1.2 lifetime abortions (not shown). With education added to the prediction equation (not shown), the average is 1.1. The estimates range from a low of 0.4 in China to a high of 3.0 in Albania.

In Table 5, the estimates from the regression approach for aggregated geographic regions are compared with estimates from more conventional approaches made by the Guttmacher Institute and the World Health Organization (WHO) (Sedgh et al. 2007). In general, the two sets of estimated rates are in close agreement with a few exceptions. For the world as a whole, they are identical—a TAR of 0.9. For developing countries, the TAR estimated from the regression equation is 1.1, compared with the Guttmacher–WHO estimate of 0.9. A similar correspondence between the two sets of estimates appears for Asia, Latin America and the Caribbean, and North America. In East Asia, the lower regression estimates (mainly in China) may reflect an exaggeration in Chinese data of the proportion using modern methods.

Results of the conventional and regression estimation approaches are the same for Southern and Eastern Africa, but not for the rest of the continent, where the regression approach suggests considerably higher abortion rates. In Europe, the large difference is in the South, mainly Italy and Spain. Since "nearly 70 percent of Italian gynecologists now refuse to perform abortions on moral grounds" (Agence France-Presse 2008), the official registration figures may indeed be underestimating the number of abortions. In Albania and Greece, withdrawal remains as the main method of contraception and the higher regression estimate seems reasonable.

Estimates from a Modified Model

TAR estimates for developing countries from a modified regression equation are presented in Table 6. These are based on a variant of the basic equation that excludes the TRAD component. It considers the regression results at various combinations of modern prevalence and related TFRs (e.g., a range of TARs resulting from no modern use and a TFR of eight births per woman, to 80% modern method use and fewer than three births per woman). The actual equations are shown in the footnote of the table. This greatly simplified exercise conveniently yields an approximate estimate at best of the TAR. These estimates are probably slightly higher than the actual TARs. The only input required is the percentage of married women currently using a modern method of contraception (MOD) and the TFR. Both of these statistics are widely available.

Chapter Conclusions

Several studies have used residual estimation with mixed success. This variability emphasizes the sensitivity of the model to fluctuations in input values (Johnston and Hill 1996; Johnston 1999; Rossier 2002). While different evaluations of the rearranged proximate determinants model have shown that it can generate surprisingly realistic estimates, the evaluations also show that different data sets representing the same population and the same time period can yield very different residual estimates.

Given the sensitivity of the residual technique to data error, it should only be used when the researcher is confident of the quality of the input data. At best, only approximate estimates can be expected. While DHS data sets provide accessible and internationally comparable estimates of demographic indicators for developing countries, whether the quality is sufficient to yield realistic abortion rates using the residual model is questionable. In summary, the residual estimation technique may be helpful in circumstances where the input data are of high quality and alternative estimates are either unavailable or thought to be of poor quality.

The highly condensed discussion of the regression equation approach hints at its obvious limitations, the first being the relatively small number of countries on which the regressions are based. Nonetheless, it seems highly unlikely that the extremely high correlation between the use of modern contraception and the TAR is a chance phenomenon. The main problem lies in extending the regression approach to the least developed countries, where reliable abortion data for validation are very scarce; this very scarcity, of course, is the main rationale behind the whole effort. As the original report concluded: "This paper is very much in the spirit of a work in progress that could benefit from suggestions and additional data."

Overcoming the limitations posed by the lack of existing reliable data to validate results from model-based approaches, especially in least developed countries, remains a formidable challenge. Creative methodologies and approaches to developing models to predict induced abortion are still being refined and will likely continue to evolve.

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TABLE 1. Equations and data needed to calculate residual index of abortion

Variable	Equation	Data needed
TFR	TFR = Σ ASFR	Age-specific fertility rates
Residual index of abortion	C_A = TFR / (TF * C_M * C_C * C_I)	TFR, TF, C_M , C_C , C_I
Index of marriage	C_M = TFR/TM	TFR requires age-specific fertility rates. TM, the total marital fertility rate, requires age-specific fertility data and age-specific rates of entry into first union.
Index of contraception	C_C = 1– (1.08 * e * u)	e = contraceptive effectiveness. u = contraceptive prevalence.
Index of postpartum insusceptibility	C_I = 20 / (18.5 + i)	i = mean duration of months abstaining or amenorrheic after giving birth.

TABLE 2. Comparison of TARs and annual abortion rates derived from the residual technique with indirect estimates from the Abortion Incidence Complications Method (AICM) and direct household survey estimates, by data source

Method and input data source	Residual index of abortion (C_A)	TAR (lifetime no. per woman)	Abortion rate (no. per 1,000 women)
Residual method estimates			
1994 MDHS			
Total Matlab study area	0.75	1.97	56.3
MCH–FP area	0.78	1.33	38.0
Comparison area	0.72	2.80	80.0
1994 DSS			
Total Matlab study area	0.88	0.77	22.0
MCH–FP area	1.03	–0.12	–3.4
Comparison area	0.77	1.92	54.9
1996 DSS			
Total Matlab study area	0.86	0.77	22.0
MCH–FP area	0.92	0.07	2.0
Comparison area	0.79	1.46	41.7
Indirect estimates based on AICM, 1995			
Bangladesh	na	u	26–30
Dhaka Division	na	u	38–42
Direct estimates, 1997 AFS			
Total Matlab study area	na	0.83	23.6
MCH–FP area	na	0.34	9.6
Comparison area	na	1.39	39.6

Notes: na=not applicable. u= unavailable. *Sources:* Johnston 1999; Singh et al. 1997

TABLE 3. Sensitivity Analysis: Changes input values used to calculate C_A and TAR and the response of C_A and TAR to the percentage change in input values (input values in bold)

Measure	Percentage change						
	–25	**–10**	**–5**	**0**	**+5**	**+10**	**+25**
TFR (lifetime births)	**2.27**	**2.73**	**2.88**	**3.03**	**3.18**	**3.33**	**3.79**
C_A	0.64	0.77	0.82	0.86	0.90	0.95	1.07
TAR	1.94	1.24	1.00	0.77	0.53	0.30	–0.41
Ab/1,000 women	55.49	35.34	28.63	21.91	15.20	8.49	–11.66
Total average maximum potential fertility (births)	**11.48**	**13.77**	**14.54**	**15.30**	**16.07**	**16.83**	**19.13**
C_A	1.15	0.96	0.90	0.86	0.82	0.78	0.69
TAR	–0.60	0.22	0.49	0.77	1.04	1.31	2.13
Ab/1,000 women	–17.14	6.29	14.10	21.91	29.72	37.53	60.97
Total marital fertility (births)	**3.23**	**3.67**	**3.85**	**4.04**	**4.25**	**4.49**	**5.39**
C_M	0.94	0.82	0.79	0.75	0.71	0.67	0.56
C_A	0.69	0.78	0.82	0.86	0.90	0.96	1.15
TAR	2.13	1.31	1.04	0.77	0.49	0.22	–0.60
Ab/1,000 women	60.97	37.53	29.72	21.91	14.10	6.29	–17.14
Contraceptive prevalence (% of women reporting using a method, modern and traditional)	**46**	**55**	**58**	**61**	**64**	**67**	**76**
C_C	0.59	0.51	0.48	0.45	0.42	0.40	0.31
C_A	0.66	0.77	0.81	0.86	0.92	0.98	1.23
TAR	2.68	1.49	1.12	0.77	0.43	0.10	–0.81
Ab/1,000 women	76.60	42.50	32.01	21.91	12.21	2.85	–23.28
Mean duration postpartum amenorrhea	**8.18**	**9.81**	**10.36**	**10.90**	**11.45**	**11.99**	**13.63**
C_I	0.75	0.71	0.69	0.68	0.67	0.66	0.62
C_A	0.78	0.83	0.84	0.86	0.88	0.89	0.94
TAR	1.33	0.98	0.87	0.77	0.67	0.57	0.30
Ab/1,000 women	37.89	27.94	24.87	21.91	19.08	16.34	8.67

Source: Data are generated from the 1996 DSS for the total Matlab ICDDR,B study area, as in Johnston 1999.

TABLE 4. Total abortion rates estimated for less developed countries

Country	Year		Country	Year	
Albania	2002	3.0	**Malawi**	2004	0.8
Azerbaijan	2006	2.8	**Mexico**	2004	1.0
Bangladesh	2004	1.3	**Nepal**	2006	1.2
Brazil	2005	0.7	**Niger**	2006	1.2
Cambodia	2005	1.7	**Nigeria**	2003	1.5
Cameroon	2004	1.7	**Pakistan**	2006-07	1.6
China	2003	0.4	**Peru**	2004-05	1.3
Colombia	2005	0.7	**Philippines**	2003	1.5
Cuba	2004	0.9	**Saudi Arabia**	1995-2000	1.2
Egypt	2005	0.8	**Senegal**	2005	1.6
Ghana	2003	1.6	**South Africa**	2003	0.9
Haiti	2005-06	1.5	**Syria**	1995-2000	1.4
India	2005	1.0	**Tanzania**	2004	1.3
Indonesia	2003	0.9	**Uganda**	2006	1.3
Iran	2000	1.2	**Yemen**	2005	1.2
Jordan	2002	1.2	**Zambia**	2001-02	1.1
Kenya	2003	1.1	**Zimbabwe**	2006	0.5

TABLE 5. Comparisons of Guttmacher WHO recent estimates with the regression estimates of Total Abortion Rates: 2003

	Regression	Guttmacher-WHO	Difference		Regression	Guttmacher-WHO	Difference
World	0.9	0.9	0.0	**Europe**	1.1	0.8	0.3
Developed	0.9	0.8	0.1	Eastern Europe	1.6	1.3	0.3
Developing	1.1	0.9	0.2	Northern Europe	0.5	0.5	0.0
Africa	1.3	0.9	0.4	Southern Europe	1.5	0.5	1.0
Eastern Africa	1.2	1.2	0.0	Western Europe	0.4	0.4	0.0
Middle Africa	1.5	0.8	0.7	**Northern America**	0.6	0.6	0.0
Northern Africa	1.2	0.7	0.5	**Oceania**	0.8	0.5	0.3
Southern Africa	0.8	0.7	0.1				
Western Africa	1.5	0.8	0.7	**Latin America & Caribbean**	0.8	0.9	-0.1
Asia	0.9	0.9	0.0	Central America	0.9	0.8	0.1
East Asia	0.5	0.8	-0.3	Caribbean	1.0	1.0	0.0
South Central Asia	1.2	0.8	0.4	South America	0.8	1.0	-0.2
Southeast Asia	1.1	1.2	-0.1				
Western Asia	1.6	0.7	0.9				

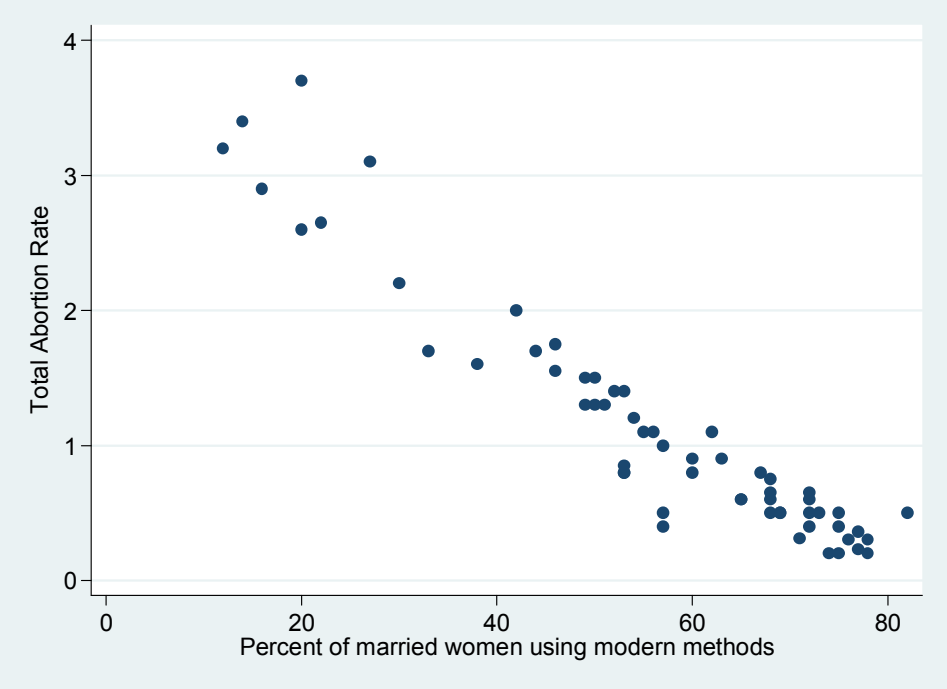
* Estimates for all of Africa, Asia, Latin America and the Caribbean, and the total developing countries total are based on Equation 7. For the world total and for Oceania, the estimates are based on Equation 3. For the most developed countries the estimates are based on an equation similar to Equation 1 (confined to the 33 most developed countries).

TABLE 6. Model total abortion rate estimates* in developing countries for combinations of MOD and TFR

MOD	TFR						
0	3.8	2.9	2.6	2.2	1.8	1.4	1.0
10	3.3	2.6	2.2	1.8	1.4	1.0	0.6
15	3.1	2.4	2.0	1.6	1.2	0.9	0.4
20	2.8	2.2	1.8	1.4	1.1	0.7	0.3
25	2.6	2.0	1.6	1.2	0.9	0.5	0.1
30	2.3	1.8	1.4	1.1	0.7	0.3	
35	2.1	1.6	1.3	0.9	0.5	0.1	
40	1.8	1.5	1.1	0.7	0.3		
45	1.6	1.3	0.9	0.5	0.1		
50	1.3	1.1	0.7	0.3			
55	1.1	0.9	0.5	0.1			
60	0.8	0.7	0.3				
65	0.6	0.5	0.1				
70	0.4	0.3					
75	0.2	0.2					
80	< 0.1						

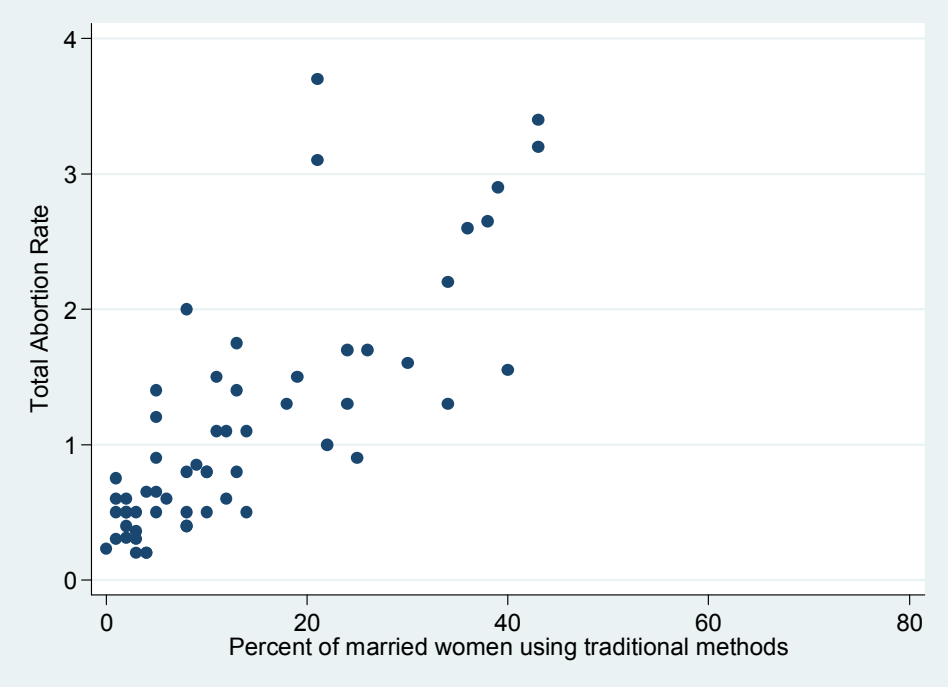
* Based on equation: TAR = 4.09 - .037 (MOD) - .386 (TFR) N = 34, R = .83.
Estimates for TFR < 3.0 are based on: TAR = 3.79 - .049 (MOD) N = 25, R = .91

FIGURE 1. Total abortion rates and prevalence of modern contraceptive methods in 44 countries



Note: See Appendix A for list of countries.

FIGURE 2. Total abortion rates and prevalence of traditional contraceptive methods in 44 countries



Note: See Appendix A for list of countries.

APPENDIX A.

Armenia (2000, 2005)
Australia (1996, 2003)
Azerbaijan (2001, 2006)
Belarus (1995)
Belgium (2003)
Brazil (1991)
Bulgaria (2003)
Canada (1984, 2003)
China (2003)
Colombia (1990)
Cuba (2004)
Czech Rep. (2003)
Dominican Rep. (1990)
Denmark (2003)
England (1988, 2003)
Estonia (2003)
Finland (1988, 2003)
France (2003)
Georgia (1999, 2005)
Germany (2000)
Hungary (1986, 2003)
Kazakhstan (1995, 1999)
Kyrgyzstan (1997)
Latvia (1996, 2003)
Mexico (1990)
Moldova (1997, 2005)
Netherlands (1982, 2003)
New Zealand (2003)
Norway (1977, 2003)
Peru (1989, 2000)
Puerto Rico (2003)
Romania (1993, 1999)
Russia (2003)
Singapore (2004)
Slovenia (2003)
South Korea (1996)
Sweden (2005)
Switzerland (2000)
Tunisia (2003)
Turkmenistan (2000)
Ukraine (2000)
United States (2002)
Uzbekistan (1996)
Vietnam (2000)

APPENDIX B.

Armenia (2000, 2005)
Australia (1996, 2003)
Azerbaijan (2001, 2006)
Bangladesh (1995)
Belarus (1995)
Belgium (2003)
Brazil (1991)
Bulgaria (2003)
Canada (1984, 2003)
China (1985, 2003)
Colombia (1990)
Cuba (2004)
Czech Rep. (2003)
Denmark (2003)
Dominican Rep. (1990)
Egypt (1996)
England (1988, 2003)
Estonia (2003)
Finland (1988, 2003)
France (2003)
Georgia (1999, 2005)
Germany (2000)
Guatemala (2002)
Hungary (1986, 2003)
Kazakhstan (1995, 1999)
Kyrgyzstan (1997)
Latvia (1996, 2003)
Mexico (1990)
Moldova (1997, 2005)
Netherlands (1982, 2003)
New Zealand (2003)
Nigeria (1999)
Norway (1977, 2003)
Pakistan (2002)
Peru (1989, 2000)
Philippines (2000)
Puerto Rico (2003)
Romania (1993, 1999)
Russia (2003)
Singapore (2004)
Slovenia (2003)
South Korea (1996)
Sweden (2005)
Switzerland (2000)
Tunisia (2003)
Turkmenistan (2000)
Uganda (2000)
Ukraine (2000)
United States (2002)
Uzbekistan (1996)
Vietnam (2000)

CHAPTER 5

Examples of Methods to Address Underreporting of Induced Abortion: Preceding Birth Technique and Randomized Response Technique

Elizabeth Oliveras and Gobopamang Letamo (Contributor: Diana Lara; Coordinator: Agnes Guillaume)

The purpose of this chapter is to present examples of data collection techniques that minimize or eliminate the underreporting of induced abortion, which is particularly relevant in contexts where abortion is illegal or access is highly restricted. The methodological challenge of measuring induced abortion, which is deliberately practiced clandestinely, has led researchers to adapt estimation methods that can investigate stigmatized behaviors. The techniques described in this chapter are the Preceding Birth Technique (PBT) and the Randomized Response Technique (RRT). These methods, when combined with population and pregnancy data, can yield indicators such as abortion rates and ratios, and when applied to data for multiple years, can yield information about trends in induced abortion. However, they cannot obtain detailed information on the characteristics of women who have induced abortions. The results of RRT in particular are usually used to complement findings from other research techniques.

Part I. Preceding Birth Technique

Elizabeth Oliveras

PBT is an estimation method that was originally developed to approximate under-two mortality in settings where the majority of births are registered (Brass and Macrae 1984; Brass and Macrae 1985). Briefly, women coming to register the birth of a child are asked whether they had given birth before; if the answer is yes, they are asked when, and whether that child survived. The resulting data are then used to estimate the rate of under-two mortality for the general population.

PBT was subsequently adapted as an alternative method of tracking changes over time in adverse pregnancy outcomes, including induced abortion. This modification was conceived for use in developing-country settings where both cross-sectional and trend data are lacking at the national and local levels. As with women who are asked about the survival of previous births, women can also be asked about outcomes of prior pregnancies. The method provides a rough approximation of the proportion of all pregnancies that end in induced abortion (referred to as an abortion ratio, or the number of abortions per 100 pregnancies).The method is applied with a convenience sample of women attending health facilities for prenatal or delivery care, which makes identifying the target population simpler than using a community-based approach. PBT is particularly useful in documenting trends in induced abortion over time and is relatively simple to implement because it involves only a slight modification to routine facility-based data collection procedures.

Application of PBT in Ghana

A pilot test of PBT to assess its feasibility in estimating stillbirths, miscarriages and induced abortions was conducted in Accra, Ghana (Oliveras et al. 2008). Data were collected during prenatal and maternity visits made from November 2003 through January 2004 at three public and two private clinics. As such, the sample reflects women with access to prenatal and maternity services available in Accra and is not representative of the general population.

Staff nurses at the participating clinics collected the data as part of their routine care. Prenatal clients were interviewed at the time of check-in, and delivery clients were interviewed at a time that was convenient for them; all interviews were strictly confidential. All women older than 15 who came to the clinics for services were included. Since the pilot showed that the method worked better in terms of implementation and reporting with prenatal than with delivery clients (Oliveras et al. 2008), the text below describes its application in the recommended setting of prenatal care provision.

To ensure that each prenatal client was interviewed just once, clients were only eligible (and interviewed) if they were making their first visit. Women's background characteristics were collected from both health records and the study questions to allow researchers to assess any personal characteristics that could be associated with abortion.

Nurses conducting routine intake interviews incorporated four additional questions that asked about the outcome of a woman's preceding pregnancy (Table 1, see table at the end of the chapter). First, each woman was asked whether she had been pregnant before. Women who said they had were asked about the outcome of their last pregnancy. If that pregnancy did not end in a live birth, the woman was asked if she had had a stillbirth, a miscarriage or an induced abortion. Women who reported a

spontaneous or induced abortion were asked an additional question in familiar, local language to minimize any confusion between the two. In this pilot study, the phrase "put a hand to it [the pregnancy]" was used because qualitative research in Accra had found this to be a common euphemism for inducing an abortion (Aniteye 2003).

Once women who are pregnant for the first time are excluded, the remaining women's reports of their most recent prior pregnancy provide the input data for the method. As shown in Table 1, this is straightforward for both live births and stillbirths. However, differentiating between miscarriages and induced abortions can be challenging. A pregnancy is considered to have ended in a miscarriage if the woman says it did (see below for potential data quality issues here) and if she answers "no" to the final question—whether she or someone else "put a hand to it." If a woman does not respond to this final question, we assume that the pregnancy ended in an induced abortion since women are unlikely to overreport induced abortions.

To calculate the abortion ratio, the number of women indicating having had an induced abortion is related to the total number of reported pregnancies (the number of women surveyed minus those with no prior pregnancies). The abortion ratio is the number of abortions divided by the total number of reported pregnancies. To ensure reasonable precision for the estimated proportion of pregnancies ending in abortion, approximately 1,000 pregnancies are required, although fewer are needed if the abortion ratio is greater or less than 50%.

In the pilot test in Accra, 2,662 eligible women attended the participating clinics during the three-month study period; only two women refused to participate. Among the participating women, 1,636 reported a previous pregnancy and 229 of these pregnancies resulted in an induced abortion, which yields an abortion ratio of 14 per 100 pregnancies.

If the method's aim is solely to estimate the abortion ratio, only responses to the four questions outlined in Table 1 are needed. However, if a description of women who resort to abortion is desired, additional information will need to be collected from the women or existing health records.

The original PBT was designed to be implemented at any level, from an individual clinic to all health facilities nationally; the same holds true for the version modified to collect information about induced abortion. If the aim is to collect data beyond a single clinic, a broader sampling strategy will need to be considered. The pilot study showed that abortion ratios varied widely between public and private clinics, which highlights the need to include the full range of facilities when representative data are desired. Within a single clinic, sampling bias is not a concern because all women seeking prenatal care are included.

Two ethical issues are particularly important with regard to the implementation of this method. First, confidentiality is a priority. Because intake interviews may be conducted in relatively public settings (i.e., in front of other clients), confidentiality can be difficult to maintain. Careful training of staff can help ensure that they conduct the interviews in private. This may also require discussions with clinic administrators to reconfigure the setup for intake interviews. Second, in settings where pregnancy is common among young unmarried women, concerns may be raised about the appropriateness of including such women. Decisions about age-related eligibility for participation should take into account both international standards and the local context.

Although the questions were designed to reduce underreporting, data quality will always be a concern in studies of abortion. This method may also be subject to differences in reporting based on provider attitudes. Careful training and supervision are needed to ensure that all staff conducting intake interviews participate, and that they do not allow their personal attitudes toward abortion to affect the way they ask the questions.

Strengths and Limitations of PBT

The modified PBT has a number of advantages over other methods of collecting data on adverse pregnancy outcomes. Because it is carried out by health workers who are already providing care, it is relatively low cost and easy to implement. Since the questions are asked as part of routine care rather than as part of a household survey, it is more likely to reach women who may not participate in community-based surveys for a variety of reasons—i.e., they are isolated geographically; work long hours; live in housing unlikely to be covered by a survey, such as a university dormitory; or are unwilling to report an adverse pregnancy outcome as part of a reproductive health survey. In addition, patients seeking prenatal care for a presumably wanted pregnancy may be willing to mention a prior abortion if they fear it might affect the health of their current pregnancy in some way, which is not necessarily the case among women who are approached in household surveys.

With the modified PBT, recall bias is minimized because women are asked about the pregnancy just before their current one, and women in general are more likely to report recent abortions than abortions that occurred earlier (Johnston and Hill 1999). In addition, the questions are asked in such a way as to minimize misclassification due to misunderstanding. However, it should be noted that women may still purposefully report induced abortions as

miscarriages, which would lead to underestimates of abortions and overestimates of miscarriages.

Selection bias is also possible with a facility-based sample, particularly in settings where prenatal coverage is limited. To reduce this bias, alternative sites for data collection, such as family planning clinics, could also be considered if their coverage is higher than that of more generalized clinics. However, some selection bias is likely to occur in family planning clinics as well.

It is important to consider that the modified PBT will always fail to capture specific induced abortions. For example, abortions that resulted in complications that lead to sterility or death will not be counted, since the method is applied only to women who are currently pregnant. Also, the abortions of women who remain childless after an abortion will also be excluded. Further, repeat abortions are likely to be missed among prenatal clients, because women are unlikely to seek prenatal care for a pregnancy that they plan to terminate; however, if women have multiple abortions prior to having a full-term pregnancy, their last abortion will be included.

Despite these limitations, the modified PBT is useful in particular situations. While it may not reflect the absolute level of abortion in a given setting, it can be used to show trends over time, assuming that there are no changes in women's willingness to report past abortions. PBT provides a reasonable estimate of the frequency with which women terminate pregnancy and is most useful in countries where women commonly receive facility-based prenatal care and where women rely on abortion to delay a first birth and to space births rather than end childbearing.

Part II. Randomized Response Technique

Gobopamang Letamo

RRT is a data collection method developed in the 1960s by Stanley L. Warmer that is useful in obtaining information on sensitive issues such as illicit drug use (Goodstadt and Gruson 1975; Fisher et al. 1992), theft (van der Heijden et al. 2000), prostitution and induced abortion. It is specifically designed to protect the privacy of the respondent (Horvitz et al. 1967). The method is called "randomized response" because the respondent randomly selects a question with a known response probability without revealing to the interviewer which question has been chosen. The technique uses a combination of two questions with a yes-no response.

One of the questions, the subject of the research, is the sensitive question (in this case, whether a woman has ever had an induced abortion) for which the probability is unknown. The second question is nonsensitive and has a known probability of a "yes" response. The interviewer does not know the nature of the question for which she or he is recording the answer, and both the respondent and the interviewer are protected by the nonspecific nature of the response.

The researcher is able to indirectly estimate the proportion of respondents reporting the sensitive event or behavior based on the following three factors: 1) the probability of selecting the sensitive question, 2) the frequency of a "yes" response to the nonsensitive question in the study population and 3) the number of respondents who answer "yes" to either the sensitive or nonsensitive question (Lara et al. 2006). The method assumes that the respondent answers truthfully and that the proportion answering the nonsensitive question (e.g. "Were you born in September?") is known in advance (Abernathy et al.1970).

The methodology has been applied to estimate induced abortion in settings as varied as the United States (Albernathy et al. 1970), Mexico (Lara et al. 2006), Botswana (Letamo 2007), Taiwan (I-Cheng et al. 1972) and Turkey (Tezcan and Omran 1981). Generally, RRT tends to outperform other methods of estimating induced abortion such as direct questioning of women. However, implementing RRT also has drawbacks. It can be costly and time-consuming; the data are dependent on respondents establishing trust with the interviewer; sample sizes tend to need to be larger than with other indirect methods; and its application can have limited success among illiterate or rural populations.

Application of RRT in Mexico

The method was applied in 2001 with a national, multistage probabilistic sample of 1,827 Mexican women from 15 to 55 years of age (Lara et al. 2006). First, a household questionnaire to measure socioeconomic characteristics was administered to all adult household members. Then, a randomly selected woman in each household was asked to respond to a questionnaire, which included items on social and demographic information, a limited number of questions on the woman's reproductive history (including the number of living children, ideal number of children, number of unwanted pregnancies and whether family planning was used when they occurred) and the respondent's views about whether abortion should be legal. However, no direct questions on abortion were included in the questionnaire.

At the end of the survey, the randomized response method was applied with 1,729 women in the following manner: The interviewer held out two folders, one red and one green (with the color coding intended to help low-literacy women). The red folder contained a sheet of paper with a red dot and the question: "Did you ever try to interrupt a pregnancy?" The words "yes" and "no" were printed below the question. The green folder contained a

sheet of paper with a green dot and the question: "Were you born in April?" Again, the words "yes" and "no" were printed below. The interviewer then asked the participant to take a sheet from each folder and fold them into the same shape so one could not be identified from the other, and to place them in an opaque bag.

The interviewer asked the woman whether she had understood what she was being asked to do. If the participant reported doubts, the interviewer repeated the instructions. If the participant still did not understand the technique, her response was rejected. Once the interviewer was sure that the participant understood the technique, she shook the bag and asked the woman to insert her hand and select one folded sheet of paper. The participant then unfolded it and read the question silently to herself. The interviewer did not know which question the participant chose and would answer. The woman said her answer, either "yes" or "no," out loud. The interviewer then recorded the woman's response.

The calculation of the proportion of women who had ever had one or more induced abortions over the course of their lifetime (π_1) was done using the formula

$$\pi_1 = \frac{\lambda - \pi_y (1 - P)}{P}$$ where:

λ= proportion of women who responded "yes" to the sensitive RRT item (here, 222/1,792 = 0.1238).

π_y = proportion of the population expected to respond "yes" to the nonsensitive RRT item (born in April). National census statistics (as reported in Lara et al. 2006) indicate that 8.5% of annual births occur in the month of April.

P = probability of selecting the sensitive RRT item about induced abortion. As there were two questions, the probability = 0.5.

1 – P = probability of selecting the nonsensitive RRT item asking whether the respondent was born in April (0.5).

Given these data, lifetime prevalence of induced abortion in the sample was calculated as:

$$\pi_1 = \frac{0.1238 - 0.085\ (0.5)}{0.5} = 0.1626.$$

Thus, based on this indirect estimation technique, 16.3% of women in the sample have had at least one abortion over the course of their lifetime.

Application of RRT in Botswana

RRT was recently implemented to estimate abortion prevalence in Botswana with 4,676 women of reproductive age in combination with direct and indirect questioning (Letamo et al. 2007). After women were first interviewed about general background characteristics and their reproductive and abortion history (which included a filter question about unwanted pregnancy), they then participated in the application of RRT. The technique was adapted to local conditions so its implementation did not require the respondent to be literate. Further, researchers who applied the method provided a clear definition of abortion so respondents understood fully what was they were being asked to report.

The technique was carried out as follows. Since some women were illiterate, researchers used black and red beads from the traditional game of *Khupele-Khupele* to designate the two questions. The beads were to be drawn out of a bag by participants. The black beads represented the question on abortion ("Have you ever had an induced abortion?") and the red beads represented the nonsensitive question ("Were you born in the month of Botswana's Independence?"). As recommended by research, a total of 50 beads—35 black and 15 red—were used so the sensitive question would be randomly selected 70% of the time (35/50) and the nonsensitive question, 30% of the time (15/50) (Abernathy et al. 1970; I-Cheng et al. 1972; Tezcan and Omran 1981).

The interviewers mixed the beads thoroughly and explained the process to each participant before applying the method. The interviewer repeated once more what each color bead represented. The respondent was asked to repeat what the interviewer had said to check for comprehension. In answering the selected question, the respondent said only "yes" or "no," so that the interviewer could not know which question was answered. As respondents drew their bead from the bag, interviewers were instructed to turn their heads away to avoid seeing which color bead the respondent had drawn.

In the Botswana study, RRT was implemented after the background and reproductive history interview to ensure that a good rapport between interviewers and respondents had been established and that the definition of induced abortion would be clear from items on women's knowledge of and general attitudes toward induced abortion.

The proportion of women who had ever had an induced abortion ($\pi_{1)}$ was calculated as follows:

$$\pi_1 = \frac{\lambda - \pi_y (1 - P)}{P}$$ where:

λ = proportion of women who responded "yes" to the sensitive RRT item (here, 373/4,676 = 0.080.

π_y = proportion of women born in the month of Botswana's Independence (i.e., 1/12 = 0.08).

P = probability of selecting the sensitive RRT item about ever having had an induced abortion (equivalent to the ratio of black beads to total beads in the bag, or 35/50 = 0.70).

1 – P = probability of selecting the nonsensitive RRT item on whether the respondent was born in the month of

the country's independence (1 – 0.70 = 0.30).

Given these data, the calculation was:

$$\pi_1 = \frac{0.08 - 0.08\ (0.3)}{0.7} = 0.08.$$

Based on this indirect estimation, 8% of women in the Botswana sample had had at least one abortion over their lifetime.

Three additional questions were asked of the RRT participants after they completed the technique to gauge their opinion of the approach. The purpose of the first two was to measure our success in convincing the respondent that our motives were legitimate and above reproach, and that there was no veiled intent to trick or mislead. These two questions were:

1) "Now, as I said, there is no way we can tell which question was selected. Do you think other women like yourself, your friends and your acquaintances will think that there is a trick to this and that we really can figure out which question was answered?"

2) "When you selected a Khupele-Khupele bead, did you think that we could figure out which question was selected?"

The third question, whose purpose was to elicit respondents' opinions on the probable validity of the direct approach in obtaining data on induced abortion, was:

3) "If an interviewer, like myself, asked one of your friends if she had ever had an induced abortion, do you think that person would answer truthfully?"

Strengths and Limitations of RRT

Generally, RRT tends to outperform direct questioning about induced abortion (Tezcan and Omran 1981; Tracy et al. 1981; Lara et al. 2006; Letamo et al. 2007), probably because it allows respondents to report on sensitive issues with their confidentiality ensured. It thus reduces the likelihood of untruthful responses. Indeed, not knowing which question the respondent is answering is a particular strength of the method, which protects both the respondent and the interviewer. As long as absolute confidentiality is ensured, one would expect participants to feel free to truthfully respond to a sensitive question regardless of how socially undesirable their response may seem.

The method has been widely used and tends to provide higher prevalence estimates than direct questioning, but likely still underestimates true prevalence in most settings. However, the opposite situation occurred in Mexico where researchers found that RRT overestimated induced abortion relative to other methods among low-educated, rural women (Lara et al. 2004). In that study, which was conducted in urban and rural settings and compared different methodologies, researchers found that for rural areas (Chiapas), the prevalence of induced abortion attempts determined through RRT was three times higher than that from face-to-face interviews, self-administered questionnaires and audio-computer assisted self interviews (36% vs. 10–12%). RRT's relative unreliability in estimating prevalence in rural areas was confirmed by the method yielding a higher proportion in such areas of attempted abortions than of unwanted pregnancies (36% vs. 33%), a logical impossibility. Results were more logically consistent in a house-to-house survey conducted in Mexico City (i.e., RRT yielded an unplanned pregnancy prevalence of 27% and an abortion attempt prevalence of 18%). And whereas RRT resulted in the highest estimate of abortion attempts compared with the other three techniques in the Mexico City household sample, there was much less variability in estimates by method in urban areas (18% with RRT vs. 7–11% with the other three techniques) (Lara et al. 2004). Another strength of RRT is that the researcher can include a follow-up question that indirectly evaluates the reliability of responses by asking whether the woman thought a friend would answer truthfully.

A major limitation of the method is that it requires a very large initial sample size to generate a large enough sample of participants who answer "yes" to the sensitive question. For example, the sample size depends on the probability that participants select the sensitive RRT item; if researchers choose a selection probability of 0.5, then they will require twice the sample size to obtain the same power, since only half of respondents are asked about abortion. If both the probability of answering the sensitive question and the frequency of the sensitive event in the study population are low, an especially large sample size is needed to obtain enough statistical power.

Another limitation of RRT is that although the frequency of sensitive issues reported with this technique is high, research suggests that the method still tends to underestimate the event under study (Locander et al. 1976; Musch et al. 2001).

The method can be implemented relatively quickly, but the duration of an RRT interview may be slightly longer than a face-to-face interview due to the extra time needed to explain the procedure. Applying the method may require creativity on the part of the researcher, especially when used with illiterate populations.

We advise caution when using the method with illiterate or low-literacy women, women who speak a language different from that of the interviewer, and women who have problems understanding the procedure. In addition, the quality of the data collected depends on participants' level of cooperation, their suspicions of the interviewer's intentions, how clearly the method was explained to them and how well they understood it. For example, if

respondents suspect punitive or vengeful motives, they are likely to provide untruthful answers to the questions asked. Properly trained interviewers would ensure that the data collected are of high quality. The interviewers have to be able to explain how RRT works in simple terms for respondents to believe that they are not being tricked into admitting something that can be used against them. If the method is properly explained to respondents, there is a high likelihood that the responses will be truthful.

Field-staff training requires a detailed and thorough explanation of the method's application. Failure to implement it properly will render the results useless. Since the technique was first developed, several modifications have been made to increase participants' trust in the technique and enhance its sensitivity to different cultures.

Finally, RRT is limited in that it can only produce aggregated data. Even though abortion prevalence by social and demographic characteristics can be calculated, such estimates are subject to bias because they are indirect calculations based on the number of respondents who answered yes to the RRT question.

Conclusion

Both methods described here provide viable, indirect ways of estimating abortion prevalence and are particularly useful in contexts where information on abortion is scarce due to legal or moral sanctions. The strength of these methods is that they ensure confidentiality; thus, women may be more likely to answer truthfully with PBT or RRT than with direct techniques. Like any research methodology, these methods have limitations; specifically, they are unable to yield descriptive information on women who have had abortions.

According to the context, the estimates generated by the methods could underestimate or overestimate true prevalence. For example, RRT seems to provide more reliable estimates in urban areas among educated women than in rural areas among less-educated women. Ideally, the results obtained by these methods should be validated through triangulation with other data.

Like other methods that attempt to quantify induced abortion, PBT and RRT must face the challenge of correctly distinguishing between induced and spontaneous abortions. Furthermore, RRT needs to be carried out with large sample sizes to obtain statistical power. Implementing RRT may be more time-consuming and costly than the more practical and more readily implemented PBT. However, the complexity involved in applying RRT may be worth the effort when use of a high-precision method is warranted.

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TABLE 1. Questions used in the modified PBT to estimate pregnancy outcomes

Question	Response
1. Have you ever been pregnant before, even for a short while, before this current pregnancy?	1…Yes 2…No
2. Women sometimes have pregnancies that do not result in a live born child. Did your last pregnancy end in a live birth?	1…Yes→ Live Birth 2…No
3. Did it end in a stillbirth, a miscarriage or an abortion?	1…Stillbirth→ Stillbirth 2…Miscarriage 3…Abortion→Induced Abortion
4. Did you or someone else "put a hand to it"?	1…Yes→ Induced abortion 2…No→ Miscarriage

CHAPTER 6

The Abortion Incidence Complications Method: A Quantitative Technique

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Abortion is one of the outcomes of reproductive behavior that remains difficult to measure in most countries. Several methodologies using direct and indirect approaches have been developed to contribute to an accurate measurement of the level of abortion. The Abortion Incidence Complications Method (AICM) is an indirect approach that builds on the number of women treated in medical facilities for abortion complications to eventually arrive at the total number of abortions.

The goal of the AICM is to produce estimates of the incidence of abortion in settings where the procedure is highly restricted or where abortion may be permitted under broad criteria but its practice is still unsafe for many reasons (e.g., safe medical services are inadequate, unaffordable or inaccessible). The method provides estimates of the following three indicators:

a) the number of induced abortions occurring each year (incidence);

b) the abortion rate (the number of abortions per 1,000 women); and

c) the abortion ratio (the number of abortions per 100 live births).

The method can generate the above three indicators for major geographic regions and, depending on what data are collected and their quality, for smaller administrative units such as states, departments or provinces. Estimates of the number of induced abortions from this methodology can be combined with data on the number of births that are unplanned and estimates of the number of unplanned pregnancies ending as miscarriages to develop estimates of the numbers and rates of unintended pregnancies.

In addition, the AICM yields a national estimate of the number and rate of women receiving treatment in a hospital or health facility annually as a result of induced abortion complications. Although it is difficult to obtain, the facility-based treatment rate is a useful measure of the health consequences of unsafe abortion and of abortion's contribution to maternal morbidity. This indicator, which measures the safety level of abortion provision, can be compared across countries. Moreover, information on abortion morbidity is essential for estimating the costs of treating abortion complications to the health system.

This chapter provides an assessment of our experience in implementing the AICM over the past two decades in diverse settings. Each of the studies that have applied the method has addressed, for the specific case country, issues of data quality and reliability; made comparisons to other available studies or related information; and assessed consistency with external data to the extent possible. In general, the estimates of abortion incidence from the method have been found to be plausible at the global, regional, and individual country levels and across time. In the few cases where other methodologies have been used in the same country, results from the AICM compare well with the estimates from those methodologies.

Background

Measurement of the incidence of induced abortion is essential to inform reproductive policies and programs that focus on preventing unintended pregnancy, the root cause of induced—and often unsafe—abortion. A first step toward preventing both unintended pregnancies and the unsafe abortions they lead to is demonstrating their incidence.

However, in countries where abortion is highly legally restricted, and even in some countries where it is legal and accessible, documenting incidence is extremely difficult to do (Rossier 2003). One of the most important constraints to measuring the incidence of induced abortion is the stigma surrounding it, which translates into women's unwillingness to report having had one, particularly in face-to-face interviews. In addition, in settings where abortion is highly legally restricted, identifying and interviewing a representative sample of abortion providers is very difficult.

Because of the difficulties of measuring abortion incidence using direct approaches, some researchers have focused on improving these approaches or have developed indirect estimation methodologies. Over the past few decades, a number of indirect methodologies have

been developed to estimate abortion incidence in settings where it is legally restricted. This chapter focuses on one of these approaches, the AICM.

The basic methodology has been adapted to address variable data constraints and has evolved to take into account differences in abortion service provision, both across countries and over time. The method was proposed and developed in the early 1990s by the Guttmacher Institute and was first applied in six countries in Latin America—Brazil, Chile, Colombia, the Dominican Republic, Mexico and Peru (Singh and Wulf 1994). In the mid-1990s, it was implemented in two Asian countries, Bangladesh and the Philippines (Singh et al. 1997) and one Sub-Saharan African country, Nigeria (Henshaw et al.1998). In the past five years, the method has been implemented in Guatemala (Singh et al. 2006), Mexico (Juarez et al. 2008), Pakistan (Sathar et al.2007), the Philippines (Juarez et al. 2005) and Uganda (Singh et al. 2005). Currently, the approach is being used in Burkina Faso, Colombia, Ethiopia and Malawi. The methodology has also been applied by non-Guttmacher affiliated researchers in three Latin American countries—Argentina (Mario and Pantelides 2009), Costa Rica (Gómez-Ramírez 2008) and Peru (Ferrando 2002).

Overview of Data Used in the AICM

Two types of data are needed to implement the method.

- *The number of women who receive facility-based treatment for induced abortion complications.* These data are obtained in different ways, depending on the country. The two most common sources are official health statistics (where these are known to be of high quality) and nationally representative sample surveys of health facilities (Health Facilities Surveys, or HFS) that provide postabortion care.
- *The proportion of all women having abortions who receive facility-based treatment for complications.* This proportion is obtained through a Health Professionals Survey (HPS), which is conducted with experts who are knowledgeable about abortion provision in the study country and can estimate the proportion of women who develop complications and receive treatment for them. This information is the basis for calculating the multiplier or inflation factor needed to yield the overall total.

Both the HPS and the process of collecting data on the number of women who receive facility-based treatment for abortion complications are described in detail in this chapter.

Overview of Calculations Needed for the Method

Calculating Miscarriages to Remove Them from Total

Women who receive treatment in facilities for abortion complications usually include those who are treated for complications resulting from both induced and spontaneous abortions. However, national health statistics, reports from specific health facilities and HFS results typically do not distinguish between induced and spontaneous abortions because symptoms are often similar. Moreover, even when evidence points overwhelmingly toward an induced abortion, health personnel may be reluctant to classify women as induced abortion patients because doing so often requires completing additional forms and it may expose patients (and medical personnel themselves if they fail to report women to authorities) to possible legal or moral sanction.

Thus, to exclude women who have had a miscarriage rather than an induced abortion, we need to estimate the number of women whose complications stem from spontaneous abortions. For this we use data on the biological patterns of spontaneous abortion, which have been established by clinical studies (Harlap et al. 1980; Bongaarts and Potter 1983). Based on input from medical professionals dating from the method's first application, we assume that only women who suffer late miscarriages (i.e., those at 13–22 weeks) are likely to require care at a health facility.* Miscarriages at 13–22 weeks account for about 2.9% of all recognized pregnancies and are equal to 3.41% of all live births.

A further data adjustment is needed, however, because only a certain proportion of all women who need facility-based treatment for complications from a late spontaneous abortion will have access to a facility that provides postabortion care (or use such facilities for this indication). We assume this proportion to be the same as the proportion of women giving birth who deliver in a facility. This proportion, at both national and regional levels, is available from a Demographic and Health Survey (DHS) or similar survey. Thus, the number of women admitted to a hospital/health facility for complications from late spontaneous miscarriages is the product of those expected to experience a late spontaneous miscarriage and the proportion expected to receive care in a hospital or health facility. The total number of women treated in hospitals or health facilities for complications from *induced* abortions

*Although some women who miscarry at earlier gestations seek medical care, they are likely treated by primary-level facilities or by doctors in their private practice and relatively few are treated in facilities that provide postabortion care. Pregnancy losses at 23 weeks or later are not included because they are usually classified as fetal deaths rather than miscarriages.

is obtained by subtracting those treated for complications from miscarriages from the total treated for all abortion complications.

Calculating the Multiplier

However, not all women who have an induced abortion experience health complications; further, for many reasons, not all of these women seek care for their complications. Therefore, women who are treated represent a fraction of all women with induced abortion complications. We need to calculate an inflation factor (multiplier) to apply to the hospitalized numbers to account for the proportion of women having an abortion who do not need treatment or do not seek/obtain it at a health facility.

The inflation factor or multiplier is derived from information from the HPS. Data from three main questions provide the basis for this factor: the percentage distribution of all women who obtain an induced abortion according to type of abortion provider; the proportion likely to experience complications requiring medical care according to provider type; and the probability that women with complications will receive medical care at a hospital/health facility. Because women's area of residence and economic level affect their access to (and attitudes toward) abortion providers, this information is obtained for four key subgroups of women—poor urban, nonpoor urban, poor rural and nonpoor rural.

Among all women having an induced abortion, the multiplier estimates how many are *not* treated in a facility for every woman who is. The multiplier takes into account two factors: safety of the procedure and accessibility to medical care. In general, the safer the abortion, the higher the multiplier; that is, for every woman receiving treatment, a higher number will have had an abortion that does not result in complications requiring medical care. Conversely, the less safe abortion services are, the lower the multiplier; that is, the total has to be multiplied by a lower number because the number of women developing serious complications more closely approximates all women who have an induced abortion. Furthermore, where facilities are easily accessible, the proportion of women with complications who receive treatment will be relatively high. In contrast, in areas with limited access, such as poor, underserved areas, the proportion receiving treatment will be relatively low, and some women with serious complications may not get the treatment they need.

To obtain the multiplier, the following calculations are needed:

- For each population subgroup, the proportion of women who obtain an abortion from each provider type is multiplied by that provider's expected complication rate. The results are summed across all provider types to obtain the proportion of all women obtaining an abortion (in each population subgroup) who will likely develop complications that require treatment.
- The next step is to multiply the total proportion estimated to develop complications by the proportion likely to obtain care for them in a health facility (for each population subgroup). This produces the proportion of all women having an induced abortion who will receive treatment, for each population subgroup.
- Next, we weight the proportions to reflect the size of the four population subgroups within a given country. Data on the distribution of women of reproductive age according to the combined poverty and area-of-residence measure (so they sum 100%) are generally obtained from individual countries' DHS surveys: The distribution of women according to the four categories is based on an actual measure of place of residence and a proxy measure of relative poverty. In almost all countries studied so far, educational attainment has been the proxy measure for poverty: Women with a relatively low level of education are considered poor and those with a moderate-to-high level are considered nonpoor. The specific definitions of "low," "moderate" and "high" are decided by the study investigators in each country. Although an actual measure of poverty—the wealth index—is now available for DHS surveys, it has not yet been used for the AICM because it does not differentiate relative poverty within urban and rural areas: Because urban residents are relatively much better off than rural residents, almost all urban residents fall into the highest two quintiles of this index. Individual countries' national surveys that yield poverty information should be assessed to see if they provide better measures of relative poverty within areas of residence than the DHS wealth index does.
- The proportions hospitalized for treatment of abortion complications in each population subgroup are then multiplied by the proportion that the subgroup represents. The sum of the products of the pairs of values for the four subgroups is the weighted, national proportion of all women having induced abortions who are likely to have received facility-based treatment for complications.
- The multiplier is the inverse of this weighted national proportion. For example, if 23% of all women having an induced abortion are estimated to receive treatment in a hospital or health facility for complications, the multiplier is 4.3 (100/23).

Applying the Multiplier to Calculate Rates and Ratios

The total number of induced abortions in a country is estimated by multiplying the number of women admitted for the treatment of complications by the multiplier. The abortion rate (number of abortions per 1,000 women of reproductive age) is derived from the estimated total number of induced abortions and the total population of women aged 15–44 or 15–49, depending on the individual study. For these population data, presented in five-year age-groups, we rely on the country's most recent census or UN population projections. The data are interpolated to match the years for which data are obtained on the number of women who received postabortion care.

The abortion ratio is derived by dividing the estimated total number of induced abortions by the total number of live births. We estimate live births by multiplying age-specific fertility rates (from a DHS survey or some other reliable source) by the corresponding population of women of reproductive age. The abortion ratio is the number of induced abortions per 100 live births.

Strategies to Collect Data on Admissions from Complications

The sources of data to estimate the numbers of women admitted for treatment of abortion complications will vary, depending on the extent to which a given country's health statistics are reliable, complete and up to date. Below we describe three examples of the variability in countries' data quality and completeness that influenced the data collection approach used when applying the method.

Countries with High-Quality Hospital Discharge Data

The six Latin American countries where the methodology was first applied in the early 1990s fall into this category (Singh and Wulf 1994). To apply the method, available official statistics are assessed for the completeness of coverage and quality of the data. Key informants involved in management of health data systems (or other relevant sources) must be interviewed to ascertain the quality of official statistics, and the extent to which any problems are occurring. For example, where coverage is incomplete or omits information from certain geographic areas or types of facilities (as was the case with Peru), the number of treated abortion cases must be adjusted to reflect the proportion likely to have been missed. Further, some sectors may not be part of the official statistics reporting system—typically the private sector or specialized sectors such as the social security system—but available information on the caseloads of the excluded sectors can be used to estimate the number of women treated at the national level. In the first six-country application of the methodology, the degree of underreporting of postabortion hospitalizations varied, from essentially no underreporting in Chile to a level of 33% in the Dominican Republic,* as estimated by officials who were familiar with the data.

Hospitalization data also need to be assessed for incorrect diagnosis coding—i.e., cases that were incorrectly coded need to be removed or added in, depending on the specific error and how the data were recorded. For example, multiyear data for four of the six countries were available for the specific diagnosis codes 630–639† of WHO's International Classification of Diseases, Ninth Revision (ICD-9), which allowed for internal consistency checks; these checks, input from key informants and results from other in-depth studies provided the basis for some small adjustments (Singh and Wulf 1994).

For example, individual diagnosis-code data in some of the six countries allowed us to estimate the proportion of all patients who were coded 630–633 (miscarriages and obstetric pathologies) to separate out these inappropriately included cases in countries where all cases are lumped into a single grouping of 630–639. The quality of the data was further assessed using information provided by a study carried out by the Federación Latinoamericana de Sociedades de Gineco-Obstetricia (FLASOG) in four Latin American countries (Pardo and Uriza 1991). The FLASOG study compared data from individual hospital patients with official data and found that some women were incorrectly diagnosed with "threatened abortion" (ICD-9 code 640) instead of codes 634–639. This finding enabled us to adjust for cases that were miscoded as "threatened abortion."‡

Another important requirement when using official statistics is to assess the completeness of the total number of women admitted with abortion-related complications. This requires information on the structure of the health system—i.e., the main types of care provided (tertiary,

*For the Dominican Republic, a count of procedures was available from hospital logbooks only, and the data collection system suffered from other weaknesses, which resulted in a large proportion of cases being missed.

†The code values refer to the following: 630—molar pregnancy or hydatidiform mole; 631—other abnormal product of conception; 632—missed abortion, early fetal death (at 22 or fewer weeks of gestation) with retention of the fetus or retained products of conception, not following either a spontaneous or an induced abortion; 633—ectopic pregnancy, including tubal pregnancy; 634—spontaneous abortion; 635—legally induced abortion; 636—illegally induced abortion; 637—unspecified abortion; 638—failed attempted abortion; and 639—complications following abortions and ectopic or molar pregnancy.

‡The prevalence of this type of miscoding averaged 5.5% in the four FLASOG study countries. To account for the miscoded cases within code 640, we considered that the number of patients diagnosed with codes 634–639 represented 94.5% of the true number of hospitalized abortion cases. Thus, after subtracting cases miscoded as 630–633, the remaining numbers were inflated by dividing by 0.945.

secondary and primary) and the ownership category of facilities (public/government, private, nongovernmental organization [NGO]).* We also need to know whether each type or category of facility treats postabortion patients, whether official statistics capture care provided at all relevant categories of facilities and the level of completeness of these data (and if incomplete, which categories are omitted). If any categories of facilities that provide postabortion care are completely missing, the proportion these omitted categories would likely treat needs to be estimated, if possible; if not, the incidence of postabortion treatment and, consequently, of induced abortion, will be underestimated, and must be understood to miss those treated in the omitted categories of facilities. Similar adjustments are needed to correct for underreporting in included categories.

The completeness with which hospitals and health facilities actually submit their records to a central system also needs to be assessed. Even where such reporting is required, not all hospitals/facilities comply because of delays or irregularities in the submission process or simply because of incomplete and poor quality records. Interviews with key informants (typically individuals in charge of collecting discharge data) are needed to provide a basis for estimating any corrections that may be needed to adjust for omitted or incomplete discharge data; the researcher applying the AICM also needs to seek out any available information or special studies related to the issue of discharge data quality and completeness.

In addition, the quality of reporting systems may deteriorate over time for various reasons, which can affect the ability to accurately assess trends. For example, when health care provision is decentralized as of a certain date, local control of budgets increases, which reduces the incentive for local administrative offices to provide statistics to a centralized office, so fewer cases are likely reported to a central agency from that point forward. Changes in the way health care is delivered can also affect trends in data quality. For example, an application of the method currently underway in Colombia revealed serious problems of incompleteness that did not exist with data from the late 1980s through the mid-1990s. This deterioration in data quality appears to be an unforeseen consequence of health care reform in the country in 1993, which decentralized health care and recordkeeping. At the same time, the 10th version of the International Classification of Diseases, an entirely new coding system, replaced the 9th version, which likely increased the difficulty of accurately classifying patients, and affected the comparability of reporting.

*Although there are some basic structural similarities, categories of health facilities vary greatly across countries. Countries will generally have some facilities in each ownership category that offer each of the three main types of care—tertiary, secondary and primary. However, each ownership category may have subcategories, which vary across countries. For example, in Mexico, there are several subcategories within the public sector. In some countries the structure reflects administrative or geographic subdivisions; for example, in the Philippines, hospitals are categorized administratively (general, regional, provincial, municipal, district, community, medicare, specialized and military), in addition to specific levels of care (tertiary, secondary and primary).

Countries with Incomplete National Discharge Data: The Example of the Philippines

In the Philippines, where the AICM has been applied twice (Singh et al. 1997; Juarez et al. 2005), all hospitals are required to complete and submit annual reports to their regional Department of Health office; the reports include the number of patients treated for the top 10 causes of hospitalization. However, since the forms are not compiled, processed or tabulated and not all hospitals regularly submit them, we had to compile all available hospital reports, starting with those that were available from the central Department of Health office in Manila. To produce a more complete list of private and public hospitals, each regional Department of Health was visited to obtain reports for the missing hospitals.

The total number of hospitals/facilities identified in the Philippines increased from 1,863 in 1994 to 2,039 in 2000. In 2000, 81% of facilities (representing 89% of beds) had usable reporting forms. A regression approach was developed to estimate the number of women treated in the remaining 19% of facilities. In the two studies of abortion incidence, two further adjustments were made to the official data: 1) if discharge data were available for more than one year, the data were averaged over a three-year period, centered on the year for which abortion incidence was being estimated (1994 and 2000, respectively); and 2) if the form reported only part of a year, the number of patients was adjusted to create an annual estimate proportional to the number of months reported in the form.

Countries Where a Nationally Representative HFS Is Needed

Where usable official hospital discharge data are missing outright, a nationally representative HFS needs to be fielded to estimate the number of postabortion complication cases treated in hospitals. Countries where this approach has been used include Bangladesh, Guatemala, Nigeria, Pakistan and Uganda; at the time of this writing, the approach is currently being implemented in Burkina Faso, Colombia, Ethiopia and Malawi. In all but one of these countries, a nationally representative sample of facilities that likely treat postabortion complications was surveyed; the exception was Guatemala, where *all* such facilities were surveyed because the total number in the country is relatively small.

Sampling considerations for an HFS

To conduct the survey, the universe of health facilities that treat postabortion patients in a country needs to be defined. The first step is obtaining details on the structure of the health care system (i.e., the types and categories of the relevant facilities). Then, a listing of all facilities is required to draw a nationally representative sample that can be weighted to produce national estimates. This list must include information on each facility—name, location (exact address) and any characteristic that will be used for stratifying the sample (e.g., type of ownership, type of facility and major geographic area or region, depending on the country).

In some countries, the survey may need to cover both patients treated for complications of unsafe abortion and patients who are actually receiving safe abortions in these facilities. This would apply in countries where the abortion law has recently been liberalized and the provision of safe abortion is being phased in (e.g., Ethiopia and Colombia) or where safe abortion is widely and openly practiced—and providers are willing to report them—despite its being highly legally restricted (e.g., Nigeria).

Once all relevant facilities have been listed, a stratified sample design is generally used. Strata typically include major region, ownership or sector (public, private and NGO) and type of facility (hospitals and health centers, each of which may also be divided into more detailed categories, depending on the country). The size of the facility (measured by number of beds) may also be used for stratification. In most countries, 100% of the largest facilities (typically tertiary hospitals) are sampled because such facilities receive the highest proportion of the total number of postabortion cases. The exact proportion of other categories to be sampled is informed by their size and importance in postabortion care provision in a given country.

In practice, sampling fractions have typically varied from about 10% of facilities (for categories that include hundreds of facilities that treat relatively few women) to 40% or more of facilities (for categories that include relatively few facilities and/or that have large postabortion care caseloads). Facilities to be sampled are selected after systematically ordering the universe within sample strata and choosing a random start number. To some extent, the size of the sample will also depend on the resources available and the total number of facilities in each category and in the country as a whole. (As mentioned earlier, for Guatemala, all facilities that provide postabortion care were included in the sample because the entire country had a total of only 183.)

Results of an HFS

The HFS provides an estimate of the annual number of women treated for abortion complications at the national and regional levels. A key informant, or senior staff member, at each sampled facility is asked a series of questions, including whether treatment of abortion complications (from either spontaneous or induced abortions) is provided on an outpatient or inpatient basis, or both. The specific key informant will depend on the degree of specialization of the health unit. For example, in larger tertiary facilities, such as hospitals, the informant is likely to be the chief of the Obstetrics and Gynecology department (usually an OB/GYN). In smaller facilities, such as health centers or clinics, the informant is likely to be director of the facility, or a nurse, midwife or other health worker in charge who can provide information about abortion complications treated at the health facility.

In some cases, issues with the definition of "hospitalization" may arise and must be dealt with. For example in Guatemala, both inpatients and outpatients are considered to be hospitalized, so length of stay was used to define the two groups (i.e., inpatients were defined as patients staying 24 or more hours at the facility, and outpatients were those who stayed fewer than 24 hours).

For inpatients and outpatients, key informants are asked to provide the numbers treated for abortion complications at the facility in the average month and in the past month. These two numbers are averaged and multiplied by 12 to produce an estimate for the calendar year. The sample estimates are weighted up (weights take into account both the proportion of facilities that are sampled and nonresponding facilities) to produce national estimates of the total number of women treated for all types of abortion complications (i.e., those from both spontaneous and induced abortions).

Specifying the two reference periods increases the likelihood of accurate recall and of capturing variation from month to month. Doing so helps respondents who may have difficulty recalling or estimating the number of women treated in their facility for postabortion complications. Results from the HFS surveys have shown a systematic pattern at the national level of slightly higher numbers being reported for an average month than for the past month. We continue to recommend that the average of these two measures be used as the best estimate of the number of women treated in each facility. This approach accounts for the possibility of measurement error from unusual fluctuations in the past month and for the potential for bias in individuals' perceptions of a typical month.

That the typical-month and last-month estimates can differ, and that those differences can go in opposite directions for some categories (see Table 1; all tables at end of chapter), supports our recommendation. However, it is important to note that respondents in some countries have had difficulty with the meaning of a "typical" month, so training of interviewers must be careful to clarify what is meant, using alternatives to describe an "average"

month—e.g., a typical, regular or normal month.

Another important issue that must be considered when fielding an HFS is adapting the survey instrument to local conditions of abortion provision in the country. For example, the instrument must consider whether safe abortion services are also being provided in the facilities surveyed about treatment of postabortion complications. This adaptation was needed in surveys already done in Nigeria and Bangladesh and in ones that are currently underway in Colombia and Ethiopia. For example, in Nigeria, although abortion is highly restricted by law, procedures are commonly provided in private hospitals and clinics. In Bangladesh, menstrual regulations using vacuum aspiration are legally permitted and are offered in the same facilities that provide postabortion care. In these two countries, the questionnaire asked for data on the number of women obtaining safe procedures and the usual set of questions asked for the number of women treated for postabortion complications.

An alternative is to collect data prospectively in each sampled facility for all abortion complication patients treated during a given number of weeks (for example, two to four weeks). These data may be obtained from providers, from facility records, from interviewing patients, or from any combination of the three; in all cases, however, the data are for individual women. Prospective data have some important advantages over retrospective data: For example, data that are collected when care is being delivered usually provide a more accurate count of postabortion patients. In addition, a prospective design allows individual-level information (for example, women's demographic and socioeconomic characteristics) to be obtained for each patient, which permits more in-depth analysis than is possible with aggregate data obtained in the usual HFS.

But a prospective approach also has some important limitations, including high cost, logistical complexity of fieldwork, difficulty ensuring the quality of the data collected and potential for undercounting of patients (e.g., the data collection period may be unusual and not average; some patients may not be recognized as postabortion patients; 24-hour coverage of the flow of patients may be difficult to achieve; and some women may refuse to be interviewed and others may be discharged before being interviewed). Prospective surveys that have collected data on individual postabortion patients have been conducted in Egypt (Dale et al. 1998), South Africa (Jewkes et al. 2005), Kenya (Gebreselassie et al. 2004) and Cambodia (Fetters et al. 2008). In most cases, the primary goal of these surveys was to document morbidity from abortion (see Chapter 10); however, in Kenya, rough estimates of abortion incidence were calculated from the data using a hypothetical multiplier selected from the existing literature (Ipas 2004). For the first time, the AICM is being implemented—in Ethiopia—using both the prospective approach (obtaining patient-specific data) and the retrospective approach (obtaining aggregate information through an HFS) to compare these two data collection approaches for estimating the number of postabortion patients.

Strategies to Estimate the Proportion that Admitted Cases Represent

Overview of the HPS

Among all women who have an induced abortion, the proportion who will likely be admitted for treatment from complications is derived from data obtained through the HPS, a purposive sample of health professionals. These medical and nonmedical professionals are selected on the basis of their extensive knowledge of and experience with conditions of abortion service provision and postabortion care.

Three key questions are asked that yield the basis for estimating this proportion: the percentage distribution of all women who obtain induced abortions according to type of abortion provider;* the proportion of women likely to experience complications requiring medical care with each type of provider; and the probability that women who have such complications will receive care from a health facility. (The HPS also asks respondents for their opinions on family planning counseling and services in their country and on possible abortion law reform, as well as for suggestions for improving postabortion care.) Because the safety of women's abortions can vary by women's ability to pay and their access to providers, the information is obtained for each of the four subgroups of women mentioned earlier (poor urban, nonpoor urban, poor rural and nonpoor rural).

The number of provider types has increased from three in studies carried out in the early 1990s to 5–6 in those conducted more recently (see Table 2). Local partners determine how to meaningfully categorize providers based on whether each type accounts for a sufficient proportion of abortions and is sufficiently differentiated in terms of safety and access. Six provider types is probably the maximum that is acceptable, given the increased time burden required for responses on a large number of provider types and the likelihood that data quality would suffer as a result.

Further, the widespread use of misoprostol in many areas has spurred the need to incorporate questions into the HPS to measure its use. For example, the HPS questionnaire was modified to include use of misoprostol

*The categories of providers vary across countries and typically include at least the following major groups: doctors, trained nurses or midwives, untrained practitioners, pharmacies and the woman herself.

in the recent application of the AICM in Mexico (Juarez et al. 2008) and to the one currently underway in Colombia. More generally, application of the AICM must take into account changes over time in the methods of abortion in a given country to assure that the survey instrument being used accurately reflects current practice.

Sampling considerations for the HPS

The initial list of health professionals—medical and nonmedical—is prepared with input from project partners based on their contacts with stakeholders and program planners and on the content of interviews with NGOs. It is important to include some professionals from all sectors that are relevant to the issue of abortion in the country—for example, government departments, service provision, NGOs (for example, women's organizations and professional associations) and research institutions. Thus, to maximize representativeness, some professionals are chosen because they have experience treating abortion complications whereas others are included because they are researchers, women's health activists, policymakers, family planning program planners and administrators, etc.

Further, to the extent possible, professionals who have knowledge/experience of abortion practice in rural areas and a variety of regions across the country should be included in the survey. This is important because most of the professionals surveyed likely work and live in urban areas, but conditions of abortion provision may be very different in rural and provincial parts of the country.

The sample size for the HPS has varied across the countries where the AICM has been applied. In the first Latin American studies, the numbers of professionals interviewed for the HPS ranged from 21 in the Dominican Republic to 46 in Brazil (Table 2). Deciding on the number of respondents to be interviewed depends on the size of the group of individuals with extensive knowledge of abortion service provision in a given country and their willingness to be interviewed. The size of the country itself is an important factor, as smaller countries generally have fewer knowledgeable health professionals.

In addition, the desired representativeness of the incidence data influences the size of the HPS sample: In the early 1990s applications of the AICM in the six Latin American countries and in 1996 in Nigeria, the method aimed to produce national estimates only, so relatively small samples of professionals were needed (21 to 67). More recent studies, however, have aimed to estimate the multiplier and resulting incidence at both the national and regional levels, so correspondingly larger samples were used (approximately 100 in Mexico, 154 in Pakistan and 102 in Colombia). In most applications of the methodology, about two thirds of HPS respondents have had a medical background and about one third, a nonmedical background.

Application of the AICM: the Example of Uganda

The AICM was recently applied in Uganda (Singh et al. 2005). Abortion rates and ratios, along with unintended pregnancy rates, were calculated for the nation and its four major regions. Because there were no official statistics on hospitalized women for treatment of abortion complications, an HFS was conducted along with the HPS.

Sample Selection and Questionnaires

For the HFS, a stratified multistage sample design was used. The master list of all health facilities considered likely to provide medical care to women with abortion complications was categorized by type of facility within each major region of the country. Within each stratum, facilities were ordered according to ownership (public, private or NGO). We chose different sample fractions according to each type of facility's importance in the provision of postabortion care. Facility types that were recognized as more likely to treat large numbers of postabortion patients were assigned a higher selection probability. For example, 100% of hospitals in the country were sampled (see Table 1 in Singh et al. 2005). Overall, a nationally representative sample of 359 health facilities was selected from the list of all facilities likely to provide postabortion care. Of these, 313 facilities participated in the HFS. The survey data were weighted to project the results nationally, taking into account the probability of selection and the nonresponse rate of facilities by type and ownership (see Table 1 in Singh et al. 2005) and region.

For the HPS, the research team prepared a list of health professionals who were familiar with the conditions of abortion provision and postabortion care. We considered the following factors in selecting respondents: their affiliation; expertise and experience; and reputation for having extensive knowledge of and experience with postabortion care among local stakeholders in the field of reproductive health. A purposive sample of 54 health professionals was selected and 53 were interviewed (Prada et al. 2005).

The original HFS and HPS instruments were adjusted to reflect the Ugandan context.* The questionnaire for the HFS included a series of questions about whether the facility provided treatment of abortion complications in an outpatient or inpatient service, or both. If treatment was provided, the survey asked for the number of women

*For examples of HFS and HPS survey questionnaires and how they were adapted for the application of the AICM in Ethiopia in 2008, see http://www.abortionresearchconsortium.org/studyinstruments.html.

treated as inpatients and outpatients for complications of abortion (spontaneous and induced combined) in the typical month and in the past month. These two numbers were averaged and multiplied by 12 to produce an estimate for the calendar year. Data were collected from May through September 2003 by staff affiliated with the project partner, Department of Obstetrics and Gynecology, Faculty of Medicine, Makerere University (see Prada et al. 2005 for details on the fieldwork).

Estimating the Numbers Treated for Complications (Spontaneous and Induced)

Using data from the HFS, we estimated that 109,926 Ugandan women were treated in 2003 for complications from spontaneous and induced abortions (Table 3). Next, we estimated the number of women treated for complications from spontaneous abortions only to subtract them from the total. We used available data on the biological pattern of spontaneous abortion to assume that women having miscarriages at 13–22 weeks' gestation likely require care at a health facility, and that these miscarriages are equal to 3.4% of all live births. We estimated the number of births using age-specific fertility rates from the 2000–2001 Uganda DHS (UDHS) and the number of women in each five-year age-group using 2002 census data. These estimates were calculated nationally and for the four major regions; thus, an estimated 1,254,812 live births and 42,789 late spontaneous abortions occurred in Uganda in 2003.

Further adjustment is needed because only a certain proportion of women who need treatment for complications from late spontaneous abortions will have access to a health facility. According to the 2000–2001 UDHS, 39.2% of Ugandan women deliver at a health facility. This proportion varied from 58.8% in the Central region to 23.1% in the Western region. However, because project partners indicated that Ugandan women were more likely to seek care for an illness (i.e., abortion complications) than for a "healthy" event (delivery), we inflated these proportions by 50%. Thus, a total of 25,168 Ugandan women were likely treated in health facilities for complications of spontaneous abortion in 2003. Subtracting this number from the total yields an estimated 84,758 women who were treated for complications of induced abortion only (109,926 – 25,168 = 84,758, Table 3).

Estimating the Multiplier and the Total Number of Induced Abortions

Using information provided by the HPS, we estimated that 28% of Ugandan women who have an induced abortion likely receive treatment for complications (Prada et al. 2005). The national multiplier is the inverse of this proportion—3.5. This means that for every woman who is hospitalized with abortion complications, 3.5 have abortion complications but do not obtain medical care in a health facility.

Given the multiple assumptions underlying our estimates of the total number of abortions in Uganda and the likelihood that the multiplier varies by region, area of residence and poverty status, it is appropriate to present a range of estimates and recommend use of the midrange one. Thus, we calculated estimates for multipliers one unit above and below the midrange (2.5 and 4.5, respectively). These multipliers were then applied to the total number of women treated in health facilities for complications from induced abortion.

Applying the medium multiplier (3.5) to the number of hospitalized postabortion cases (84,758) yields a total estimate of 296,653 induced abortions in Uganda in 2003 (84,758 x 3.5 = 296,653). Depending on the multiplier used, the estimated abortion rate ranges from 39 abortions per 1,000 women aged 15–49 (with the multiplier of 2.5) to 69 per 1,000 (with the multiplier of 4.5). Similarly, the estimated abortion ratios for 2003 ranges from 17 abortions per 100 live births to 30 per 100 (Table 4). The midrange estimated rate of 54 abortions per 1,000 women aged 15–49 means that about five of every 100 women have an induced abortion each year; the midrange ratio of 24 abortions per 100 live births means that one abortion occurred for every four live births.

Data on the root cause of induced abortion—unintended pregnancy—can also be generated by the AICM. To calculate the unintended pregnancy rate in 2003, we combined our estimates of induced abortions with the numbers of unplanned births; the latter were obtained by applying the proportions of births that were unplanned (mistimed + unwanted) during the five-year period before the 2000–2001 UDHS to the total number of live births in 2003 (assuming little change over this short period). Nationally, an estimated 141 unintended pregnancies occurred per 1,000 women in 2003 and half of all pregnancies were unintended (Table 5).

Assessment of the AICM

Scope of the Method's Application

Since the early 1990s, when the methodology was first applied in six Latin American countries, up to the time of this writing (2009), the AICM has now been (or is in the process of being) applied at least once in 17 countries. These diverse countries span the globe and are located in the major regions of Asia (Bangladesh, Pakistan and Philippines); Africa (Burkina Faso, Ethiopia, Malawi, Nigeria and Uganda); and Latin America and the Caribbean (Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Guatemala, Mexico and Peru. The methodology had

to be modified somewhat in some studies due to existing data limitations and unique conditions of abortion provision in individual countries.

Verifying Completeness of Official Statistics and HFS/HPS Data

The method includes steps to assess the completeness of coverage and accuracy of the numbers of women treated for postabortion complications. In countries where official health statistics are available, the steps include verifying the accuracy of the diagnosis codes, conducting interviews with health officials and performing internal consistency checks on the data. In countries where an HFS had to be implemented, the quality assessment and internal validity steps include using the two reference-period questions for the number of complications treated (the past month and an average month) and collecting numbers of inpatients and outpatients separately (to ensure that both groups are included and that the total count of abortion-related cases is as complete as possible).

Wherever possible, external data can provide useful checks to estimates of the multiplier. For example, data derived from population-based surveys can be invaluable in cross-checking estimates based on health professionals' perceptions of the conditions under which abortion is provided. Data from community surveys are another valuable source for estimating the percentage of all women who obtain abortions and are treated in hospitals for complications. However, any interpretation of such survey results must take into account the high probability that women will underreport their abortion experience and the high likelihood that levels of underreporting may vary significantly by subgroup. (In addition, large-scale, nationally representative, population-based surveys are usually very expensive.).

Results from a community survey can provide a means of checking and validating HPS results if such a survey is implemented at the same time as an AICM study. In fact, only a few independent community surveys are available that provide an estimate of a multiplier, and they do not provide directly comparable data for the same time period or area covered by an HPS. However, because some critics may question using a semi-qualitative approach—the HPS, an opinion-based survey of key informants—to obtain a quantitative parameter (the multiplier), it is valuable to look at results from existing community surveys to make approximate comparisons with the range of multipliers obtained by HPS surveys.

The earliest data from such surveys on the proportion of women who had had an abortion and obtained hospital/facility care date from the 1960s in Chile (Armijo and Monreal 1965; Monreal 1976); they estimated a multiplier of 3, indicating that one in every three women undergoing an induced abortion was hospitalized. There are only a few subsequent studies of this type, and three were conducted in a single country, the Philippines. A study in a rural district in the Philippines in the mid-1980s estimated that about one in 11 women having abortions was treated in hospital, a multiplier of 11 (Gallen 1982). In the 1993 Philippines Safe Motherhood Survey, 29% of women who reported an early pregnancy loss in the three years before interview said they were hospitalized (a multiplier of 3.4), but this study suffers from a very high level of underreporting of induced abortion (National Statistics Office and Macro International 1994). Finally, a 1994, Metro Manila community survey that focused on abortion found that 36% of women who had had an abortion had been hospitalized (a multiplier of 2.8, Cabigon 1996). In Nigeria, a 2002 large-scale (but not national) study yielded an estimated multiplier of 10 (Bankole et al. 2006; Bankole et al. 2008).

In sum, these community-based surveys yield national multipliers ranging from 2.8 to 11. Although these findings are not meant to validate the results of any particular application of the AICM, they define a range for the multiplier between a minimum of 3 and a maximum of 11, reflecting a wide range of contexts with different levels of abortion safety and access to postabortion care. The finding that the group of existing community-based surveys produced a range of multipliers that span results from HPS surveys provides broad support for the use of the HPS to obtain the multiplier.

Cross-checking HPS data

In addition, checks on the consistency of HPS data can also be carried out. Tables 6, 7 and 8 present comparable data on HPS results from several countries. Table 6 shows a common pattern of nonpoor urban women obtaining the "safest" abortions—that is, a much higher proportion of these women than women in any of the other three subgroups receive abortions from trained health professionals (the first two categories combined, physicians and nurse-midwives). Nonpoor rural women generally have a somewhat similar profile to nonpoor urban women, but are more likely to resort to unsafe providers. The situation of poor urban women varies across countries—for example, poor urban women are similar to nonpoor rural women in Uganda, but they are substantially worse off, at least in terms of far lower proportions using physicians, in Guatemala and Pakistan. Poor rural women are the worst off subgroup of all four in all countries.

Table 7 shows another key measure that can be compared across groups to check expected relationships—the probability of experiencing a complication with each type of provider. As expected, the strong relationship between

provider type and likelihood of complications is mostly consistent across countries, with one important exception: Among all subgroups of women, the probability of complications with pharmacist-provided abortions and self-induced abortions is much lower in Pakistan than in all other countries.

In general, the probability of experiencing a complication with each provider type is quite similar across the four subgroups of women. Any differences that emerge are relatively small and fit the expected pattern: Nonpoor urban women have the lowest likelihood of experiencing a complication with each type of provider and this probability rises across the poverty/residence spectrum (i.e., from nonpoor rural women to poor urban women to poor rural women).

Table 8 shows the third key measure for estimating the multiplier—the proportion of women suffering an abortion complication who are expected to be treated in a health facility. The results show a plausible pattern in most countries of nonpoor urban women having the greatest likelihood of obtaining care, followed by nonpoor rural women, poor urban women and poor rural women. The exceptions are the six Latin American countries where poor urban women have the highest likelihood of being treated in health facilities, probably because nonpoor urban and rural women are expected to obtain care from private physicians in their office practice and not from hospitals.* It is notable that the expected use of care varies little by subgroup in Bangladesh and the Philippines, suggesting that access is relatively uniform across urban and rural areas. However, as with the six Latin American countries, it is also possible that nonpoor women in both urban and rural areas in these two countries obtain care from physicians in the private sector.

Evaluating estimates of miscarriages

The AICM has been modified to take into account variations across countries in women's likelihood of seeking care for late miscarriages. As explained earlier, this likelihood is estimated on the basis of clinical information on the distribution of spontaneous pregnancy losses by gestation and the assumption that women will likely seek treatment for a second-trimester miscarriage. In addition, we assume that the proportion of women suffering a late miscarriage who obtain medical care is equivalent to the proportion who deliver in a health facility. (The latter assumption was modified in Uganda and Pakistan where the proportion was inflated by a factor of 1.5, at the recommendation of local investigators who noted that women are more likely to seek care for an "illness" such as a complicated miscarriage than for a normal healthy delivery.)

However, verifying the hospitalization rate for late miscarriages presents a problem because external data are unavailable, even in countries that maintain hospital discharge statistics. For example, analysis of these data for the five of the six Latin American countries with detailed diagnosis data showed that the proportion of all hospitalized cases that were classified as miscarriages varied widely. In four of these five countries—Chile, Colombia, Mexico and Peru—that proportion ranged from less than 1% in Peru to 9% in Chile; however, 80–99% of hospitalized cases in these four countries were diagnosed with code 637–unspecified abortion, which may be spontaneous or induced. On the other hand, in the fifth country, Brazil, almost two thirds of all abortion complications were coded as spontaneous abortions.

Key informants indicated that official hospital discharge data would not provide accurate breakdowns of cases by type of abortion because the symptoms of an incomplete induced abortion can be indistinguishable from those of a miscarriage. In addition, medical personnel may be reluctant to expose themselves and their patients to the risk of prosecution by diagnosing complications from an induced abortion. Similar reasons explain the poor quality of estimates obtained by direct questioning of HFS respondents, which we tried in studies done in the early to mid-1990s.

Clearly, there is a great need for more studies measuring spontaneous pregnancy loss in developing countries. Most of the limited and now dated work in this area has been carried out in the developed world. New clinical studies in both developed and developing countries would provide a better basis for the assumptions used in our methodology.

The Importance of Generating a Range of Multipliers

In recognition of the inevitable lack of precision given the large number of assumptions that underlie the methodology, we deliberately generate a range of estimates—an upper and lower bound, and a medium "best estimate" of abortion incidence. The value of the medium multiplier, obtained through the HPS, is increased and decreased by

*The HPS question that asks about the proportion of women experiencing complications who are likely to obtain care at a facility must be worded to match the coverage of data on the number of postabortion patients. For the most recent example of the method's application in Mexico (Juarez et al. 2008), where official statistics on postabortion complications cover the public sector only, this question asked for the proportion who are expected to receive care in each sector, public and private, and the proportion who would likely not seek care at all. However, in the Latin American study conducted in the early 1990s, the question did not specify type of sector, and the official statistics (which are for the public sector) were adjusted to account for the proportion of cases that are treated in private-sector facilities.

one unit to yield the low and high estimates; we expect the actual incidence of abortion to fall within this range. It may be useful to explore other ways of calculating a range around the multiplier.

For several countries, we had to use the same estimates for major regions as for the country as a whole because the HPS sample size was too small and concentrated in major urban centers to provide a basis for calculating multipliers for each major region. One exception was Pakistan, which had a sufficiently large and representative sample to permit calculation of multipliers for each of four major regions. The results showed moderate differences across regions, with the Northwest Frontier Province having the least safe abortion conditions (a multiplier of 3.9) and Punjab and Sindh provinces having the safest conditions (multipliers of 4.7 and 4.8, respectively).

Variability in Input Data for the Multiplier

The applications of the method in Latin America in the early 1990s and in Guatemala in 2003 identified consistent differences between HPS respondents by their work background: Respondents whose main experience was in medical care estimated, on average, less safe conditions of abortion provision and less access to postabortion care than respondents whose experience was in other fields. The breakdown by respondents' health sector (public vs. private) showed a similar pattern. Indeed, compared with Latin American professionals from nonmedical backgrounds, those from medical backgrounds generally estimated higher proportions of women experiencing complications, no matter the abortion provider (Table 9). Similarly, public-sector respondents generally perceived abortions to be less safe than private-sector respondents. We attribute these differences to medical and public-sector personnel's relatively greater exposure to and closer contact with the actual consequences of unsafe abortion; interestingly, we did not find the same pattern in African countries, such as Uganda, where both medical and nonmedical professionals had uniform perceptions on safety.

Moreover, variability by medical background and sector in the expectation that postabortion complications will be treated in medical facilities in the more developed region of Latin America may stem from medical, public-sector respondents' belief that the health system is performing better than it actually is. Results from recent studies in Colombia and Mexico confirm this pattern found in the first Latin American studies. More studies are needed to confirm whether there is a consistent pattern by respondents' background and work sector in Sub-Saharan Africa. While the variability in HPS responses is likely not a major issue affecting all countries, it should be kept in mind during future work, at least in Latin America. The range of opinions about the safety of abortion and the proportions receiving care support the current approach of requiring that both medical and nonmedical respondents be included in the HPS sample to compare data and adjust the multiplier, if necessary.

Table 10 presents these countries' variable multipliers according to the respondents' professional background and health sector. The largest differences by professional background are in Colombia and the largest by health sector are in Brazil. As mentioned earlier, the Ugandan data show the opposite pattern, with medical professionals and public-sector employees predicting safer abortions than nonmedical and private-sector employees.

The increasing use of misoprostol in countries that highly restrict abortion has likely changed the types of abortion complications that result and the number of women seeking care for them. These changes have a potential impact on our estimate of the multiplier, which will likely undergo further change as reliance on misoprostol increases further. Starting with the 2007–2008 study in Mexico, the HPS questionnaire was modified to obtain information on the use of misoprostol, which is now included in the calculation of the multiplier. This was also done with the study currently underway in Colombia. In countries where misoprostol is easily accessible and widely used, its measurement should be incorporated into the methodology.

Factors Determining the Feasibility of the AICM

Time Frame for Applying the Method

The duration of data collection varies depending on whether the researcher uses official statistics or carries out an HFS and on the desired sample size of the HPS. The length of the data collection phase also depends on factors such as the country's size, the country's transportation infrastructure, the distance between sampled facilities and the availability of skilled field staff.

Based on the studies completed so far, the minimum time needed to field an HFS was 1.5 months (Guatemala, Oct.–Nov. 2003; Singh et al. 2006) and the maximum, 17 months (Nigeria, May 1996–Oct. 1997; Henshaw et al. 1998). Data collection using official records may take less time, but depends on obtaining permission to access official data and their degree of completeness. For example, in the study conducted in the Philippines, it took 10 months to examine hospital records (May 2003–Feb. 2004; Juarez et al. 2005) because not all records were available at the central office and the research team needed to obtain reports from each of the 16 regional health offices. In the six Latin American countries in the early 1990s, official data collection took between about two and six months.

The time needed to collect data for the HPS varied between 1.5 months in Guatemala (Singh et al. 2006) and nine months in Mexico (Juarez et al. 2008). Guatemala is a small country compared with the others where the methodology has been applied; although the HPS sample size in Guatemala was also smaller (74) compared with those in Mexico (132) and Pakistan (154), it was larger than that of Uganda (53), where fieldwork took 2.25 months.

Of course, the variability in time frames for the respective surveys make the overall time needed for both paramount. For example, fielding both the HFS and the HPS in Colombia took two months (Mar.–Apr. 2009; forthcoming), while fielding the two surveys in Uganda took a total of about six months (Mar.–Aug. 2003; Prada et al. 2005). Although the HFS sample sizes were similar in both countries (313 in Uganda and 300 in Colombia, respectively), Colombia had nearly double the number of HPS respondents than Uganda (102 vs. 53). However, country conditions were such that data collection still took longer in Uganda than in Colombia. These examples show that the large variability in fieldwork duration was not directly related to the methodology per se but to other factors specific to the country.

Specific Challenges in Fielding the HFS

If the lack of official statistics on postabortion complications results in a decision to carry out an HFS, a complete list of hospitals/facilities that treat abortion complications is essential. However, a master list is not always available or easily accessible, and it is sometimes incomplete or out of date. For example, if the list is more than 2–3 years old, problems could arise once the sample is drawn (i.e., listed facilities might have closed, others not listed might have opened, the classification of a facility might have changed, etc.); this situation occurred in Uganda and Guatemala, and the list needed to be updated, which proved very costly and time-consuming.

Further, in Pakistan, the list included only public or government-owned facilities; as a result, the complete lack of private-sector facilities led to an underestimate of the number of women treated for postabortion complications and of overall abortion incidence (Sathar et al. 2007). Moreover, Bangladesh's list included only facilities that provide inpatient care (i.e., facilities with at least one bed), so the HFS results also likely underestimated incidence to the extent that abortion complications are treated on an outpatient basis (Singh et al. 1997). Thus, some applications of the methodology have been unable to meet the standard criteria, which call for inclusion of all facilities that provide postabortion care in the universe from which the HFS sample is drawn (including facilities that provide either or both inpatient and outpatient care). Thus, the conditions that vary across individual countries need to be carefully assessed for each study.

The HFS sample design permits results to be weighted up to produce a national estimate of the number of all women treated for postabortion complications. With the data available to date, this weighting assumes that selected facilities are representative of other facilities in their sample design cell (e.g., government clinics in a given region, where the sample is stratified by ownership, type of facility and region). However, while HFS surveys must assume that the number of cases treated is the same within each category of facilities sampled, because data on number of beds for every facility in the universe are generally lacking, that number and the number of cases treated within each sample category can vary substantially, even in countries where facilities of a particular type are mandated to have a certain number of beds.

For example, although Uganda Level III public health centers averaged 13 beds, these facilities ranged from two to 40 beds; similarly, their monthly postabortion caseload averaged five patients, but ranged from none to 18 patients per month. It is important to note, however, that there are generally large differences between the main sample categories in facility size, so the assumption underlying sample weights remains reasonable. Other ways of weighting may prove more accurate—for example, better data on bed capacity for the entire universe of facilities or some measure of size or capacity other than the number of beds—but such data are not usually available for all facilities in a country. On the other hand, too many other nonfacility factors influence the number of postabortion admissions, not the least of which is the extent to which abortion is unsafe in a given country, the accessibility of health facilities and women's preference for nonmedical sources of care. As a result, the current approach of using the average caseload for each sample category may be the best way of proceeding. It is important to emphasize, however, that this basis for weighting makes random choice within sample strata extremely important to provide a basis for generalizing from sampled facilities to all facilities in each category.

Specific Challenges in Fielding the HPS

The successful implementation of an HPS depends on finding health professionals who are very knowledgeable about the conditions under which abortions are obtained and postabortion care is provided in their country, and about the factors that influence access to these services. Of course, the researchers tasked with identifying these individuals have to be very involved with the issue of abortion. In some cases, researchers may depend on abortion provider "friends" who can open doors to other providers

or professionals to establish a chain of potential respondents willing to be interviewed. In general, few professionals are knowledgeable about abortion provision, especially outside a country's main cities, which is an important constraint on sample size. In earlier applications of the method, most HPS respondents lived in the capital city or in one or two other major urban areas. However, more recent surveys—such as those conducted in Colombia, Ethiopia, Guatemala, Mexico, Pakistan and Uganda—have succeeded in obtaining samples of professionals who are more widely distributed throughout the country.

Severe legal restrictions on abortion pose a special challenge to fielding an HPS. Some health professionals who are known to be highly knowledgeable about abortion provision and postabortion care may be reluctant to be interviewed. This recently happened with the HPS fielded in 2007 in Mexico where one state had to be dropped from the survey because all its respondents refused to be interviewed, even though they had initially agreed to participate in the survey. Apparently, liberalization of the abortion law in Mexico City had the unexpected consequence of causing great concern among professionals in other states who feared they would somehow be associated with a similar reform movement through their participation in the study.

Certainly, selecting the most appropriate individuals to conduct the interviews is a very important aspect of implementing the survey. Interviewers should have research experience in the reproductive health field and be skilled at conducting interviews on the sensitive topic of abortion, which includes guaranteeing confidentiality to persuade professionals to participate and obtain their trust. Local partners in Guatemala and Nigeria recommended that medical doctors be interviewers because HPS respondents are often doctors themselves, who are usually more willing to talk about abortion with their peers than with persons outside the profession. In the Latin American studies carried out in the early 1990s, interviewers were social science researchers who had extensive experience in reproductive health; in recent work in Uganda, the interviewer was a mid-level social science researcher.

Another important step is training interviewer(s) who must be able to explain questions that seek to elicit respondents' perceptions about conditions of abortion provision and the likelihood that women will experience complications and obtain medical care in a facility. They must also be trained to persuade respondents to use their experience to provide their best estimate. Because this information is asked for the four subgroups of women, the concepts of "poor" and "nonpoor" must be clearly defined, particularly in countries where poverty is widespread, such as in Uganda and Guatemala.

Need for IRB Approval and Ethical Considerations

The two potential groups who participate as subjects in the method—health professionals for the HPS and key informants for the HFS—do so as part of their professional responsibilities and not as individuals. In studies carried out from the early 1990s through the early 2000s, investigators and their institutions did not consider that IRB review was needed for the HFS and HPS surveys because respondents were not providing personal information. In recent years, however, the Guttmacher Institute has required an expedited IRB review—when only the Chair of the board reviews the study, rather than the whole board.

Each country has had its own approval purpose and determining what this is, and the time required for obtaining approval or IRB review, is an important early step of implementing an AICM study. All necessary government approvals and permissions must be obtained before the study is conducted. For example, in Uganda, permission of the National Council of Science and Technology was sought and obtained after submitting a detailed description of the project, including all data collection instruments and protocols.

Analysis of the HFS and HPS data does not reveal characteristics of respondents or health facilities, and only aggregated data are used and published. Names of the interviewed health professionals are known only by the principal investigator and research team, and are kept in a secure place.

For prospective data collection, actual women with abortion complications can be interviewed or information can be extracted from medical records. In the first situation, and preferably in the second as well, full IRB approval is needed and usual protocols and procedures must be followed for informing subjects about the purpose of the study and obtaining their consent prior to participation.

In addition, the study country's government and other major stakeholders must be informed about the research effort to ensure that it benefits from input and advice early in the process and that potential users of the resulting estimates are adequately prepared for them. A project advisory panel is recommended as an efficient approach for incorporating input from key stakeholders throughout the project.

Limitations of the AICM

Like all other techniques of estimating highly stigmatized—and deliberately hidden—behaviors, the AICM is subject to the usual issues of imprecision and the inability to independently verify resulting data. Although we have tried to adjust for the expected difficulties and data problems, the method still has the following limitations that should be borne in mind:

- The method does not provide data on the characteristics of women who obtain abortions or who experience complications. Instead, it provides only aggregate counts.
- The method does not provide information on the specific abortion complications suffered (i.e., type or severity of symptoms) and their treatment. Instead, it gives only the total count of women admitted to hospitals or other medical facilities.
- Given the number of assumptions that underlie the method, the resulting estimate of incidence should be viewed as an approximate indication, rather than as an exact measure.
- Estimates of the late miscarriage rate (one of the key assumptions in calculating the multiplier) are based on clinical studies conducted about three decades ago (i.e., in the 1980s). The relatively stable biological patterns from that time may have changed in response to changes in lifestyle, diet and environmental conditions, but generalizable data on these factors are still unavailable, since more recent broad-based clinical studies have yet to be conducted.
- To calculate the multipliers, we rely on a sample of health professionals that provide their best estimates based on their perceptions of the type of abortion providers women use, the probability of complications with each, and how likely women are to seek needed care, in both rural and urban settings.
- Estimates of the number of women treated at sampled facilities for postabortion complications are based on senior staff members' perceptions of the number of women treated at their facilities in the past month and in an average month. Therefore, their estimates are likely to be approximate, but are unlikely to be biased in a particular direction.
- When there is a need to collect original data on abortion complications treated in hospitals, these efforts can involve substantial fieldwork and be quite costly.

Strengths of the AICM

The method has many advantages over other techniques of estimating induced abortion in settings where the procedure is highly legally restricted. Below we present nine of the method's particular strengths.

- The method includes a number of steps to assess completeness of coverage and accuracy of the count of women treated for abortion complications in health facilities. It also recommends that any available relevant data be used to assess the quality and completeness of the study results.
- Unlike other morbidity-based methods, the AICM follows a series of steps to estimate and then remove the proportion of postabortion morbidity that is attributable to miscarriages rather than to induced abortion. Thus, the complications data cleanly reflect induced abortions only.
- Internal checks on the consistency of patterns in HPS data can be carried out, both within the country and across countries.
- The method is flexible in allowing researchers to modify it when needed to take into account country-specific differences that may affect the assumptions.
- The method requires a range of estimates to highlight the imprecision of the central or medium estimate, given the large number of assumptions that underlie the methodology.
- The HPS provides a picture of abortion service provision in the country, including estimates of safety for four population subgroups (as measured by the proportions in each subgroup who see each type of provider and who develop complications with each type of provider).
- The method provides a reliable estimate of the numbers and rates of women who obtain treatment for complications of unsafe abortion in health facilities or hospitals. Given the general lack of such data, this is valuable, needed information, even though it is a partial measure of morbidity from unsafe abortion, since it omits women who have complications but who do not obtain care in facilities.
- The method generates a range of estimates of abortion incidence for a study country as a whole as well as for its major regions.
- The methodology can be modified to take into account changing conditions of abortion provision in terms of specific methods used (such as increasing reliance on misoprostol). It can also measure legal and/or safe abortion procedures that are performed in facilities.

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TABLE 1. Comparison of results from items asking for mean number of postabortion cases in past month and in an average month, by type of facility and ownership, Bangladesh, Guatemala, Nigeria, Pakistan and Uganda

Country (and year of data collection)	Type of facility	Category of facilities by type or ownership	Mean no. of postabortion cases treated		No. of facilities
			Past month	Average month	
Bangladesh (1995)		**All**	**15**	**18**	**108**
	Type of facility	Teaching hospital	71	90	13
		District hospital	17	20	16
		Thana headquater hospital	5	6	54
		Voluntary/NGO facility	7	7	25
	Ownership	Public-sector	18	22	82
		Private-sector	7	8	26
Nigeria (1996)		**All**	**8**	**9**	**402**
	Type of facility	Hospital	9	11	254
		Clinic	6	8	89
		Maternity/nursing home	3	4	25
		Other	6	8	33
	Ownership	Public-sector	11	14	89
		Private-sector	6	7	290
		Mission/other	17	15	23
	Type of facility and ownership	Public hospital	12	14	109
		Public clinic	11	11	24
		Public other	9	9	14
		Private hospital	6	8	145
		Private clinic	4	7	65
		Private other	4	5	44
Pakistan (2002)		**All**	**23**	**30**	**146**
	Type of facility	Teaching hospital	93	117	52
		District headquarter hospital	59	75	42
		Thana headquarter hospital	32	34	31
		Rural health center	6	9	21
Guatemala (2003)		**All**	**12**	**13**	**177**
	Type of facility	Hospital	13	14	163
		Sanatorio (private clinic)	4	5	11
		Other (health center type A)	6	5	3
	Ownership	Government	31	35	41
		IGSS (Social Security)	25	21	15
		Private	4	5	121
	Type of facility and ownership	Public hospital	31	36	40
		IGSS hospital	27	23	14
		Private hospital	4	5	109
		Other	4	5	14
Uganda (2003)		**All**	**12**	**14**	**286**
	Type of facility	Hospital	29	31	92
		Level IV health center	7	9	55
		Level III health center	3	5	108
		Private midwife	3	5	31
	Ownership	Public	13	15	187
		NGO	15	18	58
		Private	4	5	41
	Type of facility and ownership	Public hospital	37	39	51
		Level IV public health center	6	7	51
		Level III public health center	3	5	85
		NGO hospital	20	23	36
		NGO health centers (levels III and IV)	7	10	22
		Private other	7	6	9
		Private midwife	3	5	32

Sources: **Bangladesh**—Singh et al. 1997; **Nigeria**—Henshaw et al. 1998; **Pakistan**—Sathar 2007; **Guatemala**—Singh et al. 2006; and **Uganda**—Singh et al. 2005.

TABLE 2. Data and sources used in Guttmacher applications of the Abortion Incidence Complications Method (AICM), various countries and years

Region and country	Data year	Year of publication	Data on the no. of women treated for abortion complications				Data from HPS			
			Source	No. of health facility types	Ownership/sector	Sample size (no. of facilities)	Total sample size (no. of professionals)	By background		Multiplier used to calculate incidence (usually midpoint of range of three estimates)
								Medical	Nonmedical	
AFRICA										
Ethiopia	2007	2010	HFS	5	Public, private	337	79	51	28	7.3
Nigeria	1996	1998	HFS	3 [1]	Public, private, NGO [2]	672	67	34	33	3.34 [3]
Uganda	2003	2005	HFS	4 [4]	Public, private, NGO	313	53	44	9	3.5
ASIA										
Bangladesh	1995	1997	HFS	4 [5]	Public, private, NGO	110	26	19	7	5
Philippines	1994	1997	National hosp. statistics	8 [6]	Public, private	na	49	42	7	5 [7]
Philippines	2000	2005	National hosp. statistics	8 [6]	Public, private	na	na	na	na	6
Pakistan	2002	2007	HFS	4 [8]	Public=Nat'l; Private = exploratory only	Public=146; Exploratory: Private=72; Health posts=15	154	141	13	4.5 [9]
LATIN AMERICA										
Brazil	1991	1994	National hosp. statistics	7 [10]	Public, private	na	46	36	10	3.5 [11]
Colombia	1989	1994	National hosp. statistics	4 [12]	Public, private	na	30	22	8	5.5 [11]
Colombia	2008	2010	HFS	9 [13]	Public, private	289	102	47	55	4.12
Chile	1990	1994	National hosp. statistics	4 [14]	Public, private	na	41	14	27	4.2 [11]
Dominican Republic	1992	1994	National hosp. statistics	3 [15]	Public, private	na	21	16	5	3.8 [11]
Guatemala	2003	2006	HFS	3 [16]	Public, Social Security, private	183	74	63	11	3
Mexico	1990	1994	National hosp. statistics	8 [17]	All categories of public facilities	na	25	9	16	3.8 [11]
Mexico	2006		National hosp. statistics	6 [18]	All categories of public facilities	na	132	82	50	5.8
Peru	1989	1994	Partial hosp. statistics	4 [19]	Public, private	na	34	8	26	4.9 [11]

[1]Hospitals, clinics and maternity/nursing homes. [2]Public facilities (all levels of government ownership—federal, state or local); NGO facilities (mission or religious hospitals); and private facilities. [3]Multiplier of 3.34 (deduced from the total estimated number of abortions and number hospitalized) is adjusted to reflect both physician- and nonphysician-performed abortions. The study team rejected the HPS multiplier of 5.4 as too high, after careful consideration of the conditions of abortion provision at that time. (See: Makinwa-Adebusoye P, Singh S and Audam S, Nigerian health professionals' perceptions about abortion practice, *International Family Planning Perspectives,* 1997, 24(4):155–161.) [4]Hospitals, level IV health centers, level III health centers and private midwife/maternity homes. [5]Teaching hospitals, district hospitals, thana (administrative unit below district) hospitals and NGO facilities. [6]Seven types of facilities/hospitals (general, regional, provincial, municipal, specialized, Medicare and city) and medical centers. [7]The HPS value of 3.7 was deemed too low by the study team. [8]Teaching, district, subdistrict and rural health centers. [9]The HPS was large enough to estimate a multiplier for each of the four major regions; these ranged from 3.9 in the Northwest Frontier Province to 4.8 in Sindh. The initial three estimates of 4.0, 4.5 and 5.0 were not made using the usual approach, but were based on a range of assumptions of the proportion of late spontaneous abortions being treated in hospitals (50%, 35% and 23%). [10]Contracted (private hospitals that contract with the National Health System), university, nonprofit, Instituto Nacional da Assistência Médica e da Previdencia Social (InaMPS), federal, state and municipal. [11]In addition to the country-specific HPS multiplier together with the biological assumption of late miscarriages that will need hospitalization, the six early applications of the method in Latin America also used three hypothetical multipliers: 1) a multiplier of 3 and the assumption that 25% of postabortion hospitalizations are for complications of miscarriages; 2) a multiplier of 5 and the 25% assumption for miscarrieages; and 3) a multiplier of 7 and the 25% assumption outlined above. [12]Primary, secondary and tertiary hospitals and private clinics. [13]Nine categories of facilities based on level of complexity of care (primary, secondary and tertiary) and inpatient/outpatient admissions, along with likelihood of provision of postabortion care and of emergency care. [14]Hospitals (public), private facilities, university clinics and hospitals, and public hospitals outside the Ministry of Health system. [15]Hospitals, sub-centers and clinics with Secretaría de Estado de Salud Pública y Asistencia Social SESPAS), and Armed Forces and Social Security hospitals. [16]Hospitals, sanatorios (clinics) and type A health centers. [17]Instituto Mexicano del Seguro Social (IMSS), Social (IMSS), urban IMSS, rural Secretaría de Salubridad y Asistencia (SSA), Departamento del Distrito Federal (DDF), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE), Petróleos Mexicanos (PEMEX), Secretaria de la Defensa Nacional (SEDENA) and Secretaria de la Marina (SEMAR). [18]National Institutes of Health, health centers with inpatient beds, comprehensive hospitals, general hospitals, specialty hospitals and specialty health centers. [19]Public hospitals, private hospitals, Social Security hospitals and Armed Forces hospitals. *Note:* na = not applicable. *Sources:* Special tabulations by authors of data files or extraction of measures from each country's published findings.

TABLE 3. Data used to calculate the number of women hospitalized for induced abortion complications, Uganda, 2003

Region	Hospitalizations for complications of spontaneous and induced abortions	Estimated total number of live births	Estimated number of late miscarriages[1]	Estimated number of late miscarriages treated in health facilities[2]	No. of women hospitalized for complications of induced abortions only[3]
Total	**109,926**	**1,254,812**	**42,789**	**25,168**	**84,758**
Central	42,929	370,851	12,646	11,154	31,775
Eastern	25,544	361,799	12,337	7,439	18,104
Northern	20,512	213,998	7,297	2,934	17,579
Western	20,941	308,164	10,508	3,641	17,300

[1]Late spontaneous abortions = 3.41% of all live births (see text for explanation). [2]The proportion of late miscarriages that are treated in a health facility is 1.5 times that of births delivered in a health facility, assuming that women are more likely to seek care for a health problem than for normal delivery. [3]The total hospitalized for any type of abortion complication minus miscarriages. *Source:* Singh et al. 2005, Table 2.

TABLE 4. Estimated total number of induced abortions, abortion rates and ratios for a range of multipliers, Uganda 2003

Region	No. of women 15–49	No. of women hospitalized for complications of induced abortion	Multiplier and resulting no.of induced abortions			Muliplier and resulting rate (no. of abortions per 1,000 women 15–49)			Multiplier and resulting ratio (abortions per 100 live births)		
			2.5	3.5	4.5	2.5	3.5	4.5	2.5	3.5	4.5
Total	**5,497,200**	**84,758**	**211,895**	**296,653**	**381,410**	**39**	**54**	**69**	**17**	**24**	**30**
Central	1,788,372	31,775	79,438	111,213	142,988	44	62	80	21	30	39
Eastern	1,474,411	18,104	45,261	63,365	81,469	31	43	55	13	18	23
Northern	877,031	17,579	43,947	61,526	79,105	50	70	90	21	29	37
Western	1,357,386	17,300	43,249	60,549	77,848	32	45	57	14	20	25

Sources: **Total number of women aged 15–49**—United Nations (UN) Population Division, *World Population, Prospects: The 2002 Revision,* Vol. II, New York: UN, 2003. **Proportions of women living in each region**—Uganda Bureau of Statistics (UBOS) and ORC Macro, *Uganda Demographic and Health Survey* (UDHS), 2000–2001, Kampala, Uganda: UBOS; and Calverton, MD, USA: ORC Macro, 2001. **Live births**—calculated by the authors by applying age-specific fertility rates from the UDHS to the number of women in each age-group and region (generated from applying the DHS proportions to the UN population data).

TABLE 5. Estimated numbers of pregnancies, unintended pregnancy rate, percentage of pregnancies that are unintended and overall pregnancy rate, Uganda, 2003

Region	Number of pregnancies	Rate of unintended pregnancy[1] (per 1,000 women 15–49)	% of pregnancies that are unintended[2]	Pregnancy rate (per 1,000 women 15–49)[3]
Total	**1,551,465**	**141**	**50**	**282**
Central	482,064	144	53	269
Eastern	425,164	159	55	288
Northern	275,524	151	48	314
Western	368,713	110	41	272

[1]Number of unintended pregnancies (unplanned births + abortions) per 1,000 women aged 15–49 per year. [2]Number of unintended (unwanted + mistimed) / total number of pregnancies x 100. [3]Number of pregnancies (live births + induced abortions) per 1,000 women aged 15–49 per year. *Note:* We assume that 2000–2001 UDHS data on age-specific fertility rates and the wantedness status of births apply to 2003. *Source:* Table 7 in Singh S et al. 2005.

TABLE 6. For four subgroups of women by residence and poverty status, percentage distribution of their abortions according to provider type as estimated by HPS respondents, various countries

Country and provider type	Nonpoor		Poor	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
BANGLADESH (1995)				
Doctor	8	12	7	10
Nurse/Midwife	25	25	27	27
Pharmacist	35	33	40	34
Traditional Birth Attendant/Lay Practitioner	48	54	55	54
Woman herself	43	45	51	55
NIGERIA (1996)				
Doctor	13	20	15	20
Nurse/Midwife	30	35	39	42
Traditional Birth Attendant/Lay Practitioner	46	50	56	55
Chemist	50	52	59	60
Woman herself	49	52	64	60
PAKISTAN (2002)				
Doctor	13	15	16	17
Nurse, Midwife, Lady Health Visitor	40	45	48	50
Traditional Birth Attendant	40	42	50	49
Pharmacist	14	14	16	17
Woman herself	33	35	43	43
GUATEMALA (2003)				
Doctor	13	15	18	21
Nurse/Midwife - Trained	47	51	58	61
Traditional Birth Attendant	60	64	69	72
Pharmacist	51	51	61	61
Woman herself	68	69	76	75
UGANDA (2003)				
Doctor	17	25	23	32
Clinical Officer	33	41	41	48
Nurse/Midwife	35	38	41	43
Traditional Healer/Lay Practitioner	60	59	68	68
Pharmacist/Dispenser/Drug Store	45	48	51	52
Woman herself	66	65	75	75
PHILIPPINES (1996)				
Doctor	13	16	17	17
Nurse/Midwife	31	34	35	34
Chemist	25	25	27	25
Traditional Birth Attendant/Lay Practitioner	52	52	59	62
Woman herself	42	43	48	44
LATIN AMERICA (1992) - SIX COUNTRIES[1]				
Doctor	7	10	13	14
Nurse/Midwife	19	19	29	32
Untrained Practitioner (includes woman herself)	48	49	58	61

[1]Brazil, Colombia, Chile, Dominican Republic, Mexico and Peru. *Note:* Percentages are the average of all responses given by respondents. Excludes "don't know" answers. *Source:* Special tabulations of HPS data files.

TABLE 7. For four subgroups of women having abortions, percentage estimated by HPS respondents who will experience complications, by type of provider, various countries

Country and provider type	Nonpoor		Poor	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
BANGLADESH (1995)				
Doctor	8	12	7	10
Nurse/Midwife	25	25	27	27
Pharmacist	35	33	40	34
Traditional Birth Attendant/Lay Practitioner	48	54	55	54
Woman herself	43	45	51	55
NIGERIA (1996)				
Doctor	13	20	15	20
Nurse/Midwife	30	35	39	42
Traditional Birth Attendant/Lay Practitioner	46	50	56	55
Chemist	50	52	59	60
Woman herself	49	52	64	60
PAKISTAN (2002)				
Doctor	13	15	16	17
Nurse, Midwife, Lady Health Visitor	40	45	48	50
Traditional Birth Attendant	40	42	50	49
Pharmacist	14	14	16	17
Woman herself	33	35	43	43
GUATEMALA (2003)				
Doctor	13	15	18	21
Nurse/Midwife - Trained	47	51	58	61
Traditional Birth Attendant	60	64	69	72
Pharmacist	51	51	61	61
Woman herself	68	69	76	75
UGANDA (2003)				
Doctor	17	25	23	32
Clinical Officer	33	41	41	48
Nurse/Midwife	35	38	41	43
Traditional Healer/Lay Practitioner	60	59	68	68
Pharmacist/Dispenser/Drug Store	45	48	51	52
Woman herself	66	65	75	75
PHILIPPINES (1996)				
Doctor	13	16	17	17
Nurse/Midwife	31	34	35	34
Chemist	25	25	27	25
Traditional Birth Attendant/Lay Practitioner	52	52	59	62
Woman herself	42	43	48	44
LATIN AMERICA (1992) - SIX COUNTRIES[1]				
Doctor	7	10	13	14
Nurse/Midwife	19	19	29	32
Untrained Practitioner (includes woman herself)	48	49	58	61

[1]Brazil, Colombia, Chile, Dominican Republic, Mexico and Peru. *Note:* Percentages are the average of all responses given by repondents. Excludes "don't know" answers. *Source:* Special tabulations of HPS data files.

TABLE 8. Among subgroups of women experiencing postabortion complications, percentage likely to be treated in a health facility as estimated by HPS respondents, various countries

Country	Nonpoor		Poor	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
Bangladesh (1995)	63	58	52	53
Guatemala (2003)	88	79	72	61
Nigeria (1996)	67	65	48	35
Pakistan (2002)	86	71	60	41
Philippines (1996)	69	69	63	59
Uganda (2003)	83	70	62	51
Latin America (1992) - six countries[1]	59	57	70	59

[1] Brazil, Colombia, Chile, Dominican Republic, Mexico and Peru. *Source:* Special tabulations of HPS data files.

TABLE 9. Variation by HPS respondents' characteristics in their estimates of the likelihood of complications with each provider type, for four subgroups of women, various countries and years

Country and respondent characteristic (and provider type)	Nonpoor		Poor	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
GUATEMALA, 2003				
Medical background				
Doctor				
Nurse/Midwife - Trained	13	14	18	20
Traditional Birth Attendant	49	53	60	62
Pharmacist	62	65	70	72
Woman herself	52	52	61	62
	70	69	77	76
Nonmedical background				
Doctor				
Nurse/Midwife - Trained	13	14	21	24
Traditional Birth Attendant	38	43	47	56
Pharmacist	51	60	64	69
Woman herself	46	48	56	60
	61	66	75	75
Public-sector				
Doctor				
Nurse/Midwife - Trained	12	13	17	20
Traditional Birth Attendant	51	60	61	67
Pharmacist	64	68	73	76
Woman herself	60	60	70	72
	77	78	85	84
Private-sector				
Doctor				
Nurse/Midwife - Trained	13	15	19	22
Traditional Birth Attendant	40	40	53	53
Pharmacist	54	57	62	65
Woman herself	40	42	50	49
	58	58	67	65

TABLE 9. (continued) Variation by HPS respondents' characteristics in their estimates of the likelihood of complications with each provider type, for four subgroups of women, various countries and years

Country and respondent characteristic (and provider type)	Nonpoor		Poor	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
UGANDA, 2003				
Medical background				
Doctor	17	24	21	31
Clinical Officer	32	39	40	47
Nurse/Midwife	34	37	40	42
Traditional Healer/Lay Practitioner	43	45	47	49
Pharmacist/Dispenser/Drug Store	58	58	68	68
Woman herself	66	65	75	75
Nonmedical background				
Doctor	21	33	32	40
Clinical Officer	36	48	44	54
Nurse/Midwife	41	46	49	49
Traditional Healer/Lay Practitioner	56	63	66	67
Pharmacist/Dispenser/Drug Store	67	69	71	70
Woman herself	67	66	74	71
Public-sector				
Doctor	16	22	21	29
Clinical Officer	34	40	42	48
Nurse/Midwife	32	36	39	40
Traditional Healer/Lay Practitioner	37	42	46	48
Pharmacist/Dispenser/Drug Store	53	58	64	65
Woman herself	59	63	70	71
Private-sector				
Doctor	20	30	26	38
Clinical Officer	31	41	40	49
Nurse/Midwife	39	43	45	49
Traditional Healer/Lay Practitioner	59	58	59	58
Pharmacist/Dispenser/Drug Store	69	63	75	73
Woman herself	77	69	81	80

TABLE 9. (continued) Variation by HPS respondents' characteristics in their estimates of the likelihood of complications with each provider type, for four subgroups of women, various countries and years

Country and respondent characteristic (and provider type)	Nonpoor		Poor	
	Urban (%)	Rural (%)	Urban (%)	Rural (%)
LATIN AMERICA, 1992 - SIX COUNTRIES[1]				
Medical background				
Doctor	8	10	14	12
Nurse/Midwife	26	18	34	32
Untrained Practitioner (includes woman herself)	54	47	58	60
Nonmedical background				
Doctor	7	11	14	17
Nurse/Midwife	13	19	24	32
Untrained Practitioner (includes woman herself)	44	51	58	62
Public-sector				
Doctor	9	10	14	15
Nurse/Midwife	24	18	33	33
Untrained Practitioner (includes woman herself)	58	48	62	62
Private-sector				
Doctor	6	10	12	13
Nurse/Midwife	15	19	26	32
Untrained Practitioner (includes woman herself)	40	51	53	60

[1]Brazil, Colombia, Chile, Dominican Republic, Mexico and Peru. *Source:* Special tabulations of HPS data files.

TABLE 10. For countries with available data, variation by HPS respondents' characteristics in multipliers for calculating incidence of induced abortion

Year and country	Professional background		Health sector	
	Medical	Nonmedical	Public	Private
1992				
BRAZIL	3.61	3.77	2.51	6.80
CHILE	5.28	3.97	3.78	6.26
COLOMBIA	5.28	10.41	4.70	7.12
DOMINICAN REPUBLIC	1.17	3.48	2.87	3.15
MEXICO	3.73	4.15	3.42	4.87
PERU	4.06	4.97	4.57	5.12
2003				
GUATEMALA	2.47	3.00	2.26	3.13
UGANDA	4.03	2.73	3.84	3.48

Source: Special tabulations of HPS data files.

CHAPTER 7

Measuring Abortion with the Anonymous Third Party Reporting Method

Clementine Rossier

The three most obvious actors involved in a clandestine abortion are the abortion seeker (the woman or the couple), the provider of the illegal abortion (for abortions that are not self-induced) and the provider of legal postabortion care (in the case of complications that require treatment in a hospital). All the direct data-collection methods described in this manual rely on one of these three actors. Each is a direct witness to the practice of abortion, and thus is uniquely qualified to report on it. But how complete is the information collected through surveys with these "direct witnesses?" To assess the validity of data from each of these actors, we need to answer the two following questions. First, is the actor necessarily involved in all abortions and, if not, in what proportion? Second, if the actor is interviewed, how willing is he or she to talk about abortion?

As shown in Table 1, (see table at the end of the chapter), the answers to these two questions depend on the legal context of the procedure. Where abortion is legal, or illegal but tolerated, abortion providers are the most complete source of information on the practice of abortion. In settings where it is illegal, not openly tolerated and socially stigmatized, none of the first three actors offers complete information on abortion; in fact, women and providers may be very reluctant to offer *any* information about induced abortions in such contexts.

In this chapter, we present an original method of collecting abortion data, the Anonymous Third Party Reporting (ATPR) method, which uses information from a fourth actor, the abortion seeker's confidants (see bottom panel of Table 1). Because close friends or relatives are often asked to help in the search for illegal abortion providers, these individuals are almost always involved in the process in settings where providers are underground and difficult to access. Also, anonymously reporting others' abortions is much less stigmatized than is reporting one's own. This fourth actor and source of information thus may yield relatively *complete* information on abortion in the very settings where data on induced abortion is the most difficult to collect—in countries where access to abortion services is highly restricted and the procedure is practiced clandestinely as a result.

Goal of the Method and Indicators

The goal of the ATPR method is to collect quantitative data on induced abortion in countries where access to abortion services is highly restricted and the practice is clandestine. The method yields data on the incidence of abortion, the social and demographic characteristics of women who resort to abortion (age, educational level, employment, parity, marital status, residence, etc.), and the characteristics of the procedures they obtain (who provides them, the abortion technique used, the rate of postabortion complications and care, etc.). In other words, the method allows us to "collect" abortion statistics in countries where the practice is illegal.* It also produces information on the profile of women who receive postabortion care in hospitals and on the "multiplier," or proportion of all abortions that hospitalized cases represent, which postabortion cases need to be inflated by to obtain the total number of abortions.

The indicators that the method can provide are:

- annual abortion rate per 1,000 women aged 15–49 in the geographical area under study and by region, place of residence (urban/rural) and age;
- total abortion rate (the number of abortions women will have over their lifetime, assuming that current rates persist);
- the percentage distribution of abortions by women's characteristics (educational status, employment, parity, marital status), by type of provider and by abortion technique;
- the proportion of abortions that result in complications;
- the proportion of abortions with complications that are treated in a health facility; and
- the percentage distribution of postabortion cases by characteristics of the woman, abortion provider and abortion technique used.

*The exception is data on gestational age, which are difficult to collect with the ATPR method because only providers can accurately report on this variable.

One could mistakenly think that even more information could be collected using the ATPR method—such as data on whether the male partner knew about the abortion, who made the decision to have it and the costs involved—but since the ATPR method is based on survey respondents' reports on abortions in their social networks, we recommend that its use be restricted to constructing only the simplest indicators of abortion practices, such as those listed above.

Also, since retrospective reporting of third parties' abortions are highly susceptible to recall bias, indicators should be computed from information on recent abortions only. Ideally, one would use data collected on abortions that occurred during the year preceding the survey. In order to increase the number of abortion cases without increasing the number of women in the sample, data can also be collected on abortions that occurred during several years preceding the survey. In that case, the quality of each year's input data has to be checked.

Background

The ATPR method, also known as the confidants' method, was developed during a five-month stay in a village in Burkina Faso in 2000. In an exploratory study, participant observation, an anthropological method, was used to gather information on illegal abortions. Conversations with key informants revealed that villagers were unwilling to talk about their own abortions, in both informal conversations and structured interviews. Yet villagers were surprisingly well-informed about—and willing to talk about—the abortions of others. This situation has four main explanations (Rossier 2002), namely:

1. In rural Burkina Faso, abortion providers do not operate openly. Villagers know that abortion services exist, but they do not know who performs abortions. In other words, abortion services are clandestine and individuals are unable to access them directly.

2. Finding an abortion provider thus constitutes a major problem for women or couples who want to interrupt an unwanted pregnancy. They first approach their social network of close friends or relatives (confidants) for help in locating and accessing abortion services. These friends or relatives then search within their own social networks for someone who had an abortion in the recent past who would be able to introduce others to that provider.

3. Individuals who help abortion seekers locate abortion services are bound to secrecy either by the links of kinship or friendship (when the relationship is characterized by mutual trust) or by the bond of shared transgression.

4. Often abortion seekers request an abortion from someone known to be a provider only to be told that no such service exists. Indeed, to protect themselves, providers may only accept clients who are recommended by someone they already know (typically a former client).

A qualitative investigation involving 30 interviews in 2001 in Ouagadougou, the capital of Burkina Faso, confirmed these findings (Rossier et al. 2006). Respondents were willing to talk about the abortions of their friends or relatives (and a few were willing to talk about their own). In almost all reported abortions, friends or close relatives were asked to help locate an abortion provider; the few exceptions were abortion seekers whose friend or close relative was an actual provider.

The current situation in Burkina Faso is strikingly similar to the abortion situation in the United States during the 1960s. Howell (1969) described the "search for an (illegal) abortionist" using similar language—that is, women or couples who wanted an abortion started their search by talking to their closest friends or relatives, who themselves searched among their own circles for someone who recently had an abortion and could recommend an address. The way that information about abortion circulates in Burkina Faso (a secret ultimately known by a lot of people) is also well explained by existing sociological theories of secrets (Rossier 2007a). Thus, abortion seekers probably rely on their close friends or relatives (that is, their confidants) to locate illegal abortion providers in *all settings where abortion services are underground*.

Shortly after the Ouagadougou study, Elul (2004) applied the ATPR method in the state of Rajasthan, India. In that study, self-reports yielded a higher number of abortions than the third party method did, which suggests that the ATPR method is less successful in settings where abortion is legal and services are relatively accessible, as is the case in India. In such settings, women and couples who want to terminate a pregnancy do not have to ask friends or relatives for help in locating abortion services. However, the application in Rajasthan yielded an encouraging result for the method: Respondents' attitudes toward abortion were not linked to their probability of reporting a third party's abortion. In other words, since respondents with liberal abortion attitudes were as likely to report others' abortions as were respondents with restrictive attitudes, the fear of social stigma does not appear to have influenced the reporting of third party abortions.

Description of the Method

Step I. Sampling

The first step to implementing the ATPR method is to draw a representative sample of women* of reproductive age (15–49). The size of this first sample depends on

*In our first application of the method, we experimented with an initial sample of men. However, since we found men to be somewhat less knowledgeable than women about abortions in their female social networks (see text for more details), we recommend that the method be used with initial samples of women.

the expected size of the social network sample (see Step II, section 2) and on the expected annual rate of induced abortion in the social network sample.

Step II. Survey Instrument

The questionnaire that implements the ATPR method is short and made up of the following four sections.

Section 1

This opening section collects respondents' social and demographic characteristics. The section should use wording similar to that used in another source (such as a Demographic and Health Survey, or DHS) so the responses can be compared with other results to assess the representativeness of the first sample.

Section 2

This section uses a "network-generating question" to list and characterize all women aged 15–49 whom respondents say currently confide in them. We thus use the first sample to create a second one. The network-generating question can be worded as follows: "We want to know about the women who currently share their secrets with you, discuss their intimate lives with you, who confide in you." The notion of "confidence" is key, since abortion seekers first turn for help to their confidants—that is, to the persons they trust most and who keep their secrets.

Applying the ATPR method requires clearly distinguishing between individuals on the giving and receiving ends of a confidence, as we are interested in reports by respondents of women who confide in *them*. For example, let us imagine that individual X confides her secrets to individuals A and B; A and B are her confidants. However, A and B do not confide in X; but X receives the confidences of Y and Z; in other words, X is the confidant of Y and Z. Here, we are interested in listing Y and Z who, if they had had an abortion, have likely talked to X about it. We are not interested in A and B, whom X does not know intimately (they do not confide in her). It is possible (although optional) to start Section 2 with a question about the respondent's own confidants. Indeed, when people are asked about individuals in their immediate social circle, they spontaneously talk about the people *they* confide in (that is, their own confidants). Once they list these individuals, respondents may then more accurately list people who confide in them (the people for whom they are confidants), which is the population that interests us.

A small qualitative investigation may be necessary to determine how to express the idea of "confidence" in the local language(s). It is better to not mention "secrets regarding reproductive matters" or "intimate issues such as abortion" in the network-generating question, since this specific wording may introduce biases in the social network sample. Indeed, knowing that the interviewer is interested in abortions, respondents may mention all distant relatives or acquaintances that they know to have had an abortion, even if those individuals are not particularly close to the respondent. In that case, the sample of network members would lose some representativeness and be biased toward women who have had abortions, and thus overestimate the incidence of abortion. Note that the network-generating question targets only *women of reproductive age,* since only women at risk for unintended pregnancy have abortions. We also ask only about women who are *currently* confiding in the respondents to minimize recall bias and collect data on the most recent abortions possible.

To maximize the number of women in the network sample, the questionnaire could ask respondents for the number of women who confide in them according to each type of relationship. For instance, the item could be worded "Among your sisters, how many confide in you?" or "Among your coworkers, how many confide in you?" etc.

In a second step, we attribute a number to each woman who is cited as a confidant and ask about the following characteristics: relationship to the respondent (sister, friend, etc.) and duration of her status as confidant, age, educational level, current residence and main residence in the past few years (e.g., one, two, three, etc.). To be able to weight the second sample, which is biased toward women who themselves have several confidants, we also ask how many women other than the respondent the confidant is close to (see Step III below for more details).

Section 3

In a third section, we ask whether each of the respondent's confidants had had an induced abortion (with response categories of "yes," "no" and "do not know") in a given time period preceding the survey (one year or longer depending on the period of interest). We ask the question only if the confidant was of reproductive age at the time, lived in the area of interest and had confided in the respondent. It is very important to probe the respondent for each positive ("yes? are you sure?") or negative ("no? are you sure?") answer. If there is any hesitation, the answer should be classified as "do not know" to maximize the accuracy of the data collected.

Section 4

In this final section, we ask whether each reported abortion terminated a pregnancy or if it resulted in an incomplete abortion attempt. Although we clearly ask about induced abortions in Section 3, some respondents may misunderstand this term, and report their relatives *spon-*

taneous abortions; thus, an additional question can check whether the reported abortion is indeed induced and not spontaneous. For each completed induced abortion, we collect the following information: the woman's parity, marital status and employment status at the time of the abortion; the type of abortion provider; the abortion technique used; whether the woman suffered health complications from the abortion; whether she received postabortion care in a health facility; and, if yes, in what type of facility. We also ask whether any confidants of the woman other than the respondent knew about the abortion. (Since we already asked about the woman's total number of female confidants, we can ask here whether all, some or none of her confidants know about the abortion.) This question is used to investigate possible bias introduced by some abortions being more well-known than others in a given social network (see Step III for more details).

Optional Sections

These four questionnaire sections are sufficient to apply the ATPR method. Respondents can also be asked about their own abortions in an additional section (to be placed, for example, after Section 4) to compare results from applying the ATPR method to self-reports of abortions. Another optional section can measure respondents' attitudes toward abortion to confirm that, all else being equal, respondents with negative attitudes toward abortion are no more likely than others to underreport their friends' or relatives' abortions. One possibility here is to adapt the abortion attitude scales that were developed for research on abortion in the United States and Europe. Respondents could be asked whether they think abortion is acceptable in a range of situations, such as when the woman's life is endangered by the pregnancy, in the case of rape or incest, in the case of fetal malformation, when the partner does not want the child, in the case of difficult economic circumstances or in other situations more specific to the context under study (Rossier 2007b). Other more simple questions are possible such as "Are you in favor of legalizing abortion?" A section assessing attitudes toward abortion is best placed at the end of the questionnaire to avoid asking respondents to expose possible negative attitudes before asking them to report on their close friends' or relatives' abortions or their own.

Step III. Data Analysis

Data analysis is then performed in the following eight steps.

1. Ensure that the first sample of women of reproductive age is representative by comparing the respondents' social and demographic characteristics to similar data (such as results from the most recent DHS).

2. Count the number of women aged 15–49 currently confiding in the respondent. Compare their characteristics to those of the first sample; the two samples may be different, since women who have an especially wide social circle (i.e., a high number of confidants) are more likely to be captured by the network-generator question. Note that having social capital (or large social networks) is usually linked to having socioeconomic resources and that outmigration from an area typically reduces the size of social networks, at least temporarily. If necessary, weight the second sample with the inverse of the variable "number of other women the friend/relative confides in," and check that the representativeness of the second sample is improved by the use of this weight.

3. Calculate the number of "person-years" among the respondent's confidants to calculate the denominator for abortion rates (by study year, age, rural or urban area of residence, etc.). We know the length of time in which the friend/relative has been confiding in the respondent; when the duration of that confidence is shorter than the period targeted by the denominator, eliminate all person-years during which the friend/relative was not yet confiding in the respondent. Also, eliminate all person-years that are not in the designated reproductive age-range or that were lived outside the place of interest. Further, eliminate the person-years during which the respondent did not know whether the friend/relative had had an abortion.

4. Count the number of abortions occurring during the selected person-years. Eliminate all unsuccessful abortion attempts and spontaneous abortions, in case there are any. Compute the ratios of abortions to person-years to obtain abortion rates. Several options are possible, depending on how we treat person-years for which we have no information (i.e., we can assume that no abortions take place during those person-years or we can assume that abortions occur at the same rate as with person-years for which we do have information).

5. Verify that recall bias does not unduly influence abortion rates as could happen with rates decreasing markedly the further back in time the multiyear data go. Also verify whether the abortion rate among social network members with more confidants is similar to that among those with fewer confidants. If the two variables are related, weight the second sample with the answers to the question "number of other women the person confides in" before computing the abortion rates. (The weight should be inversely proportional to the number of confidants.)

6. Compute the percentage distributions of abortions and of women who obtain them by characteristic; compute the rates of complications and of hospitalizations. Note that the inverse of the hospitalization rate is

the "multiplier" by which hospital records of postabortion patients should be multiplied to obtain the total number of abortions in the population. Several versions of these calculations are possible depending on how we treat abortion cases for which we lack complications data.

7. Check how characteristics of abortions (technique used, type of provider, whether complications developed and where they were treated) and of the women having them (age, marital status, parity, employment, education, residence) vary by the number of confidants who know about the abortion. If certain abortions are known to a greater number of confidants than others (for example, abortions that ended in serious complications that required hospitalization), which is not our assumption, the ATPR method will underestimate the overall abortion rate and overestimate the complication and hospitalization rates.

8. Project the number and characteristics of abortion patients who are hospitalized for treatment of complications in the study area by collecting from other sources the number of women aged 15–49 in the area, then multiply that number by the annual abortion rate and apply the hospitalization rate to the estimated number of abortions. Compare this result to facility-based postabortion care statistics, if available; the two sources should correspond. Note, however, that even if this tells us that the ATPR method was successful in collecting representative data on induced abortions that led to hospitalizations, its tells us nothing about those cases that did not receive or require facility-based postabortion care.

An optional step of the analysis, should the data be available, is to verify whether respondents' attitudes toward abortion affect their likelihood of reporting others' abortions (everything else being constant). We hypothesize that these two variables are independent, since respondents' have no reason to fear being stigmatized themselves by reporting the abortions of others.

*The questionnaire used in our application of the ATPR method had a number of shortcomings and limitations. First, it specified having had an induced abortion as an example of the type of "secret" confidants could share with respondents. Second, the questionnaire failed to collect data to estimate and/or correct for the two possible sources of bias of the method: the number of women other than the respondent whom the friend/relative confides in and the number of confidants other than the respondent who were informed about the abortion. Moreover, the instrument did not collect data on the confidants' educational level, parity, marital status and employment at the time of the abortion. Finally, although the questionnaire did ask about respondents' attitudes toward abortion and used those responses to compute a tolerance scale (Rossier 2007b), we did not check whether reports of third parties' abortions were independent of respondents' abortion attitudes.

An Application of the Method

We administered the four-section questionnaire outlined above* to a representative sample of men and women living in Ouagadougou, Burkina Faso, in November 2001. We adopted a two-stage cluster sampling procedure, which was cheaper to use than a one-stage cluster or a random sample because the only available sampling list was a list of census tracks dating from the last census. Using citywide data from the 1996 census that were updated for nonzoned areas, we randomly drew 57 census tracks weighted by their population. We then enumerated the population in the selected census tracks and randomly drew households weighted by their size. All women aged 15–49 were interviewed in the selected households. To assure confidentiality, we avoided collecting identifying information on the respondents' friends or relatives, and referred to them by numbers throughout the questionnaire.

A separate sample of households was constituted to draw a sample of males; all men aged 15 and older were interviewed in the selected households. Overall, 82% of the selected women and 84% of the selected men completed the questionnaire, which yielded sample sizes of 963 women and 417 men, respectively. Weights were calculated for each individual to render the two samples representative of women and men of reproductive age in Ouagadougou.

Earlier that year, during the summer of 2001, we performed an inventory of public and private health centers in Ouagadougou to be able to cross-check the data obtained through the ATPR method. We selected all health facilities that were equipped to treat severe abortion complications; five facilities met our criteria. (These facilities are referred to later in the text as the five "referral centers.") We prospectively recorded all postabortion care patients admitted to these centers' obstetrics and gynecology wards from September through December 2001. Altogether, there were 464 admissions for postabortion care during the four-month study period.

We compared male and female respondents' reports of abortions among women in their social networks. There was no difference by respondents' sex in whether younger friends or relatives had confided in them about an abortion, but men were less likely than women to know about the abortions of older friends or relatives. This finding is likely explained by older women's greater autonomy and resources, which makes them less likely to ask for help from male friends or relatives. Male respondents also estimated higher complication rates and proportions of abortions performed by health workers than did female respondents. Since men in general were less likely than women to be involved in the abortion process (e.g., the

male respondents in our sample usually knew only about their friends' or family's most difficult abortion cases), we used data from female respondents only to generate our estimates.

Altogether, the original sample of 963 women reported 1,150 close female confidants whose age range was similar to their own. We calculated the denominator for the abortion rate by counting the number of close friends or relatives who were exposed to the risk of abortion in each year from 1997 through 2001. Confidants were considered at risk if they were aged 15–49, lived in Ouagadougou and had a close relationship with the respondent at the time. The numerator was calculated as the number of reported abortions in each year of exposure to the risk of induced abortion (1997, 1998, 1999, 2000 and 2001). Over all person-years of exposure, respondents knew that a confidant had had an abortion in 4% and that they did not have one in 88%; respondents lacked sufficient information for the remaining 8% of person-years of exposure. Respondents were better informed about their confidants' abortion experiences for the later years of the study period (i.e., confidants' abortion experience was unknown for 4% of person-years in 2000 and 2001, compared with 12% for 1997–1999).

Assuming that no abortions occurred during the "unknown" person-years (other less-conservative assumptions are possible), the annual abortion rate was 41 abortions per 1,000 women aged 15–49. The abortion rate increased between 1997 and 1999, and remained stable between 1999 and 2001. However, the total abortion rate, an indicator that controls for the age-structure of the population of confidants, was found to be stable between 1997 and 2001. Adolescents had the highest annual abortion rate of any age-group: Each year, 61 of every 1,000 women aged 15–19 had an induced abortion.*

In total, respondents reported 168 induced abortions among their friends or relatives. Respondents knew who provided their confidants' abortions in 86% of reported cases (143/168).† According to provider-type data, health workers (or people posing as health workers to abortion seekers) induced 61% of all abortions in Ouagadougou, women themselves self-induced 26% of the reported abortions and traditional healers performed the remaining 13%. Respondents knew the specific abortion technique used in about half (56%) of their confidants' abortions (96/168). Among those abortions in Ouagadougou for which the method was known, the most common technique was by injection (one abortion in three), followed by dilation and curettage (one abortion in five) and overdoses of household drugs (one abortion in eight).

The complication status (whether the respondent thinks her confidant experienced a negative health outcome) is known for 84% of the abortions reported in respondents' social network (145/168). We calculated a complication rate of 60% (87/145). Among women who experienced negative health outcomes, 45% received no medical care, 31% received postabortion care in one of the city's secondary health centers and 24% were treated in one of the five referral centers included in the study. Overall, 33% of the induced abortions ended up in a secondary health center of Ouagadougou and 14% were treated in one of the five referral centers. Admissions for complications from induced abortion in these five centers should therefore be multiplied by 7.0 (the inverse of 14%) to obtain the total number of abortions at the city level.

We projected the annual number of induced abortions in Ouagadougou by applying the age-specific rates of induced abortion that were estimated from the social network data to the city's female population. The result is 7,764 induced abortions. We then applied the complication rate estimated from the same data (60%) to yield 4,645 induced abortions requiring care every year in Ouagadougou. Applying the hospitalization rate (14.3%) to the same 7,764 induced abortions, we projected that 1,112 induced abortions were treated annually for complications in Ouagadougou's five referral centers (or 929 abortions instead, assuming that all abortions for which respondents did not know if their friend/relative received postabortion care were uncomplicated procedures).

The data we assembled on postabortion care provided in the five referral centers from September through December 2001 as a cross-check to the ATPR data indicated some 464 admissions for care of complications from miscarriages and induced abortions. We applied the WHO protocol (Figa-Talamanca et al. 1986) by asking a number of questions whose responses were then organized as denoting possible, probable and certain induced abortions using the following criteria: Possible induced abortions were cases involving unplanned pregnancies; probable induced abortions included cases with severe complications; and certain induced abortions were those for which the patient or her family admitted that the abortion was induced and for which the patient showed evident signs of an induced abortion (e.g., an object was inserted into the vagina).

All together, 71% of the cases, or 328 cases over the four-month period, were classified as induced (possibly, probably or certainly) abortions. We then multiplied that value by three to generate the number of hospital-

*No confidence intervals were calculated, so we are unable to report whether differences in abortion rates by age are statistically significant.

†The percentages mentioned in the body of the text are weighted, but the Ns presented in parentheses are unweighted.

ized induced abortion cases in the city over a full year. We conclude that each year, the five referral centers of Ouagadougou admit 984 patients with complications from induced abortions (and 408 patients with complications from spontaneous abortions), a figure that is very close to the estimate yielded by the ATPR method.

Strengths and Limitations of the Method

Validity Checks

The measures produced by the ATPR method can be subjected to a series of internal validations, including the following.

- The representativeness of the first sample (social and demographic characteristics) can be assessed by comparison with external data.
- The representativeness of the second sample (social and demographic characteristics) can be assessed by comparison with the first sample. In particular, women who confide in many friends/relatives are likely to be overrepresented in the second sample; if these women have different social and demographic characteristics than other women, the second sample can be corrected by weighting it with the inverse of the network members' number of confidants.
- We can check whether women with more confidants are more likely to resort to abortion than other women (which is possible in a context where access to abortion services depends on social capital). If the two variables are related, we can correct for this bias by weighting the second sample with the network members' number of confidants (if not already done).
- We can check whether stigma influences the reporting of third parties' abortions by relating respondents' attitudes toward abortion to their probability of reporting social network members' abortions. (We assume that there is no relation between these variables, since only women who actually have an abortion are stigmatized, not individuals who report on the abortions of others.)
- We can check whether the characteristics of a reported abortion are related to the number of confidants who know about it. (We assume these variables to be unrelated, since our qualitative data showed that almost all abortions, no matter how they are obtained, are reported to confidants in settings where social networks are key to finding abortion providers; if women or couples have difficulty finding an effective abortion provider [or method] or experience complications, they inform people outside their close social circle.)

Note that the two earlier applications of the ATPR method—in the capital of Burkina Faso, Ouagadougou (Rossier et al. 2006) and in the state of Rajasthan, India (Elul 2004)—have run only a few of these validity checks. A new test of the ATPR method to measure abortion at the national level in Burkina Faso is currently underway. That test should allow us to perform a greater number of validity checks.

Potential Biases

Counterintuitively, the inherent possibility that the abortions of women who confide in several respondents would be double-counted is not a problem because such double-counting would apply equally to the numerator and the denominator, which does not change the estimates, as statisticians know well.

The most obvious bias is introduced by respondents not knowing about all the abortions among women who confide in them. Even in contexts where access to abortion services is very underground, some women may obtain an abortion without the help of their close friends or relatives (for example, by going directly to a provider or by asking a person known to have had an abortion). Alternatively, women may select different confidants to confide different secrets. In both cases, the method will underestimate the abortion rate.

If some abortions (i.e., the ones with the most serious complications) are more likely to be known than others, the method will not only underestimate the abortion rate but overestimate the proportion that result in complications and are treated in facilities. We can check for this kind of bias by examining abortions by the number of confidants who know about them (but we cannot correct for this bias if it is present).

The ATPR method will also underestimate the abortion rate if respondents are reluctant to report on third parties' abortions; we can check for this bias by relating respondents' abortion attitudes to their probability of reporting confidants' abortions (but we cannot correct for this bias if it is present).

On the other hand, the method will overestimate the abortion rate if women who have more confidants are more likely to have abortions than are other women, which is possible in contexts where access to abortion services depends on one's social network. However, we can check and correct for this bias with the question on network members' total number of confidants.

Another potential problem of the method is its inability to capture the abortions of women who die from their complications. The only way around this problem would be to have a network-generator question that asks respondents about women who had confided in them in the past (for example, one year ago). Respondents would then be

asked to record all abortions and deaths among those past confidants during that time. But the sample size necessary to capture maternal mortality due to abortion using such a question would have to be very large.

Logistical and Feasibility Considerations

The cost and time frame for implementing the ATPR method is the same as that for any survey using a representative sample of reproductive-age women. Since the ATPR questionnaire is short, it can be inserted into an existing reproductive health survey, which would lower its administrative costs even further. It is preferable to work with a staff of female fieldworkers, whose training should address and deal with their possible negative attitudes toward abortions. Training also needs to focus on ethical issues and on confidentiality issues in particular. The ATPR questionnaire is otherwise easy to administer, since respondents usually like to talk about members of their social network.

However, three key issues need to be resolved before applying the ATPR method in a given context. First, to determine whether use of the method is even relevant, a small qualitative study should be conducted to determine whether abortion services are underground (i.e., difficult to access) and whether abortion seekers rely on confidants to locate providers. Second, if the government enforces a highly restrictive abortion law, the ATPR method is not applicable for ethical reasons, since authorities may use the results to prosecute women or providers. Finally, in countries where abortion is illegal although rarely prosecuted, the application of the method will need the same authorization as any other reproductive health survey; it can thus be presented as such or, in some settings, as a specific survey of the practice of abortion.

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TABLE 1. Actors involved in obtaining an induced abortion and the completeness of the information they provide

Actors in abortions	Is this actor involved in all abortions?	Level of willingness to report abortions	Level of completeness of information on abortions
DIRECT WITNESSES			
Abortion seekers	Yes	Low where abortion is highly stigmatized; medium where abortion is legal or tolerated	Low where abortion is highly stigmatized; medium where abortion is legal or tolerated
Abortion providers (illegal or legal)	Yes, except with self-induced abortions where abortion is illegal; yes where abortion is legal and medicalized	Very low where abortion is illegal and not tolerated; high where abortion is legal	Very low where abortion is illegal and not tolerated; very high where abortion is legal
Postabortion care providers (legal)	No; only involved in abortions with complications	High	Low; only involved in abortions with complications
INDIRECT WITNESSES			
Abortion seekers' confidants	Depends on confidants' involvement in the abortion process; can be high	High	Depends on confidants' involvement in the abortion process; can be high

CHAPTER 8

The Sealed Envelope Method of Estimating Induced Abortion: How Much of an Improvement?

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The focus of this chapter is on a particular direct but anonymous method of collecting data on induced abortion to estimate its prevalence—the Sealed Envelope Method (SEM). Despite some attractive features, the method, which directly asks women whether they have had an abortion, has rarely been used, possibly because it has not been widely disseminated and researchers do not know that it exists. Thus, the objective of this chapter is to describe the advantages and disadvantages of the method and explain its application in one country in detail, including that application's benefits and drawbacks. It also validates results from the SEM by comparing them with estimates of abortion from face-to-face interviews, which are highly likely to underreport abortion prevalence, as well as with those generated by a method that is commonly accepted as robust, the Abortion Incidence Complications Method (AICM).

Since the SEM yields estimates of abortion prevalence (the proportion of women who have ever had an abortion in their lifetime) and the AICM generates estimates of abortion incidence (the annual number of abortions per 1,000 women of reproductive age), a second objective of the chapter is to develop a technique to convert prevalence into rates to directly compare resulting data. That technique proposed here will be useful in assessing the validity of future applications of the SEM.

Description of the SEM

The method described in this chapter is also known as the "Secret Ballot Approach." Its overwhelming advantage is its anonymity, as responses to questions on abortion are sealed in an envelope (or ballot box) and cannot be linked in any way to individual women. An essential part of the methodology is the respondent's trust in an interviewer's guarantee of anonymity. Not having to admit to an abortion in front of an interviewer frees up the respondent to openly report on any abortions she has had. The method can consist solely of a short, self-reported questionnaire or be part of a longer community-based survey interview that includes a face-to-face component.

The self-reported component asks about the respondent's abortions, typically in a recent time period. The respondent puts the completed, confidential questionnaire into an envelope and seals it, then puts the envelope into a ballot box or gives it to the interviewer, who puts it into a bag or box with other envelopes. To increase the likelihood that respondents will report their abortions, it must be clear to them that the interviewer has no way of identifying the information as being specific to any individual respondent. The data collection approach also allows for all individual-level information from the main interview to be linked with the sealed envelope data and analyzed jointly. Each survey questionnaire has a unique identification code that can be matched with the identification code on the sealed envelope questionnaire. Thus, analysis of the SEM data can be enhanced by data on the respondent's characteristics and behaviors from the community survey.

The SEM can be particularly useful in countries where abortion is illegal or highly stigmatized because of religious or moral beliefs, such as in countries with strong Catholic influence at both the population and government levels. The method has been applied in only a few instances and relatively little is known about its potential. However, results of a 1994 study in Metro Manila, the Philippines (Raymundo et al. 2001) and a 1992 study in urban areas of Colombia (Zamudio et al. 1994; Zamudio et al. 1999) suggest that the method has promise and should be more widely applied.

For the 1992 application in Colombia, the method was applied in a nationally representative, large-scale survey of urban households. Women self-administered a short questionnaire, sealed their response in an envelope, and then placed it in a special box. The Colombia application generated an annual rate of 24.6 abortions per 1,000 women aged 15–49 for the period a few years before 1992. This rate was 73% of the rate estimated for all of Colombia for the year 1989 based on an application of the AICM using hospitalization data (Singh and Wulf 1994). Since the secret ballot approach was used in urban areas only, which generally have higher abortion rates than rural areas, the gap in results from the secret box application and the nation-wide AICM application is likely wider than 27% (100%–73% =27%). The SEM was similarly used in the Philippines in conjunction with a 1994 community survey in Metro Manila, in which a short separate questionnaire was administered and then collected in a

sealed envelope. That application obtained a prevalence of induced abortion of about 17% for all women of reproductive age (Raymundo et al. 2001).

In 2004, we conducted a national-level Community-Based Survey of Women (CBS) among women of reproductive age (15–49) in the Philippines and used the same sealed envelope approach as in 1994. The 2004 nationwide application differed from the 1994 application in Manila in the use of a very short questionnaire of just four questions that would fit onto a single page. The reduction from the 20–30 questions in the 1994 Manila survey was made to increase data quality. Because the 1994 survey was conducted with urban women only, we applied the wider 2004 survey nationally to assess how well the method works with women in the general population.

Data Needs

Data Collection

The sealed envelope questionnaire is an add-on to a community survey; thus, the overall data collection approach is one of a community survey. The main survey that provides the entry point for the sealed envelope questionnaire may investigate abortion-seeking behavior and the health consequences of unsafe abortion; assess general reproductive health issues; or research general aspects of the population. To take full advantage of the data generated through the sealed envelope technique, it would be best if the community survey collected supporting data, such as women's background characteristics and, if possible, relevant reproductive health data, such as contraceptive use, history of unplanned pregnancy, abortion-seeking behavior, etc.

The main community survey questionnaire is administered through face-to-face interviews, while the sealed envelope questionnaire is self-administered in private. The main questionnaire contains a filter question to identify literate women who are eligible to respond to the sealed envelope questionnaire. The filter usually uses two questions:

"Do you know how to read and write?"

"Are you able to read a newspaper?"

When planning the length of the sealed envelope questionnaire, it is important to weigh the advantages of asking many detailed questions against asking just a few. A short, self-administered questionnaire can improve the quality of the data collected by making it easier for women to answer the items, especially after they have finished participating in a likely tiring face-to-face interview as part of the main survey. Another important aspect to consider is the simple phrasing of questions and the attractive presentation of the questionnaire. The technique can be applied with as few as three simple questions: one question to identify whether a women had ever been pregnant and not carried to term; for those who had, a second question to identify women who had ever had an induced abortion; and a third question to ask women who had had an abortion when that abortion took place (preferably within the recent past). Examples of these questions follow.

Have you ever had any pregnancy that was not carried to full term? Yes/No

Did you or a doctor or anyone else do something to cause the premature termination of your pregnancy? Yes/No

When did this happen? Month and Year

There are many ways of asking for the timing of an abortion—for example, for abortions occurring in the last three years, the response categories could be "month and year," "in the "last year" or a "Yes/No" question to whether the woman had had an induced abortion "in the last three years."

Research on the quality of fertility data has shown that it is better to ask about births that occurred over the past three or five years rather than in just the last year. When questions ask about births in the past year only, respondents typically shift births either into or out of the last year, which results in underreporting for one year and overreporting for the other (United Nations 1983). We assume that these results on the reporting of fertility events would apply to the reporting of abortions. Even though (to our knowledge) no studies have assessed the best way to obtain accurate information on the date of abortions. For the national 2004 CBS we decided to ask the date (month and year) of the abortion (and about the most recent abortion if a woman reported having had more than one pregnancy loss). In addition, for women who were unable to specify a date, we asked whether the abortion occurred before 1995, between 1995 and 2000, or after 2000. Whatever approach is used, wording asking about the timing of the event needs to make the reference period clear.

Sample Considerations and Study Population

The study population for abortion research is generally women of reproductive age (15–49 or 15–44), and we used the former age-group for the 2004 Philippines study. To obtain generalizable results, it is important that the community survey is based on a random sample. The sample could be representative at the national level, urban or rural level, or even at the level of a well defined area. One important criterion for applying the SEM is the literacy level of the population, since if too many illiter-

ate respondents (who cannot fill in the self-administered questionnaire) are in the sample, then the SEM would be highly nonrepresentative. Further, we want to avoid causing any embarrassment to women who are unable to read and write. Information on the proportion of women who are literate can be obtained from sources such as the census or representative surveys. Ideally, the proportion literate in the survey area should be 95% or higher.

Data Quality and Type of Estimate Obtained

Since the add-on SEM still involves a preliminary, face-to-face direct approach to obtaining information, the resulting data on induced abortion tend to be underestimated—but not to the same extent as data obtained in face-to-face interviews. As we will see in more detail, face-to-face questions on the 2004 Philippines national survey hugely underestimated the level of induced abortion, since only an extremely small proportion of women reported ever having had an induced abortion with that approach.

One aspect that affects the quality of the abortion estimates from the community survey is the selectivity of women who would admit to having had an abortion in a face-to-face survey. Such women are very different from the general population, which introduces a bias into the abortion data and analysis. In contrast, women who reported an abortion with the SEM have a similar age and socioeconomic profile to women in the general population, which means that their abortion behavior is more representative of the country, even if the absolute level of induced abortion is underreported in the SEM.

Ethical Issues

Respondents are asked about sensitive topics in both the CBS and SEM questionnaires, so special attention must be given to ethical issues. Much has been written on the ethical guidelines for good research practice in social data collection. Researchers should adhere to the following generally recognized ethical guidelines in all modes of data collection:

- Protect research participants and honor trust (should endeavor to protect the physical, social and psychological well-being of those whom they study and respect their rights, interests, sensitivities and privacy);
- Anticipate harms (should be sensitive to the possible consequences of their work and should endeavor to guard against predictably harmful effects);
- Avoid undue intrusion (avoid intrusive potential of some of their enquiries and methods);
- Assure that informed consent is freely given (the principle of informed consent expresses the belief in the need for truthful and respectful exchanges between social researchers and the people whom they study); and
- Respect the rights to confidentiality and anonymity (the right to privacy and confidentiality should be respected) (ASA 2008).

Before initiating the community survey questionnaire, informed consent must be given for both the personal interview and the sealed envelope questions. Even after consent has been granted at the beginning of the face-to-face survey, it should be reconfirmed at the beginning of the sealed envelope component (i.e., the women should be asked again if she wants to continue with the self-administered part). (See Appendix for an example of the informed consent wording used in the Philippines.)

Given the sensitivity of abortion and its legal restrictions in many countries, it is very important to make an extra effort to protect women's anonymity and confidentiality. With this idea in mind, in our study:

- Women were not requested to sign a consent form, but to give their consent verbally and the interviewer followed up by signing off that the woman gave her consent. An alternative procedure would be for the woman to sign with a fake name; however, we prefer to not use this more complicated approach.
- We removed the address of the respondent, the listed names of her children and any other information that could identify her from the information collected for the field work. During the field work, the supervisor eliminated any names and addresses by using a black marker after the questionnaire had been completed. The special cover page with information on the respondent's name and address was removed and destroyed. Therefore, no names (of respondents or their children) or addresses were kept once the interview was judged to be complete by the supervisor.

Training of Field Staff

The training of field staff is important for high quality community surveys. Although we do not describe training in detail here, some specifics on instruction in asking about the sensitive topic of abortions are important to mention. For example, training must include alerting interviewers to the importance of noting when a respondent is becoming distressed so they can stop the interview if necessary. Interviewers need to be trained to recognize and help women in difficult or dangerous situations, including providing them with support in cases of domestic violence or sexual abuse. Agreements should be made with nongovernmental organizations and government health departments to provide health services and psychological and legal support for any respondent with special needs. If a case is especially urgent, a supervisor needs to become

involved to ensure that the woman is assisted appropriately and adequately. The training manual should summarize these points.

As mentioned earlier, the self-administered SEM questionnaire is given to literate women only and filters to identify literate women are included in the community questionnaire; interviewers are trained to check the filter responses (see Appendix) so illiterate women will not be asked to complete the self-administered questionnaire.

Application and Verification of the SEM: The Case of the Philippines

Below we present findings on abortion prevalence in the Philippines from the two data collection approaches (community survey and SEM module), and assess them against data from the AICM. Since the AICM has been widely used and is recognized to provide relatively reliable estimates of the level of induced abortion, it can serve as a good yardstick for verifying accuracy.

We hope to answer the following questions: How do the proportions of women who report an induced abortion differ between face-to-face interviews and the sealed envelope questionnaire? Do women who report an induced abortion in one approach differ from those who do so in the other? What is the level of "positive negatives"—that is, what percentage of women report an abortion on the sealed envelope questionnaire but not in a face-to-face interview? Differences in the likelihood of reporting an induced abortion in each approach are analyzed according to women's demographic and socioeconomic characteristics.

Comparing SEM estimates with those generated by the AICM raises the challenge of making the measures comparable, since the SEM generates prevalence, while the AICM produces a rate. Thus, to assess the validity of SEM results against AICM results, we also propose a method of converting estimates of abortion prevalence into annual abortion rates.

The Philippines: Study and Methodology

The original data come from the 2004 CBS, which was conducted by the Guttmacher Institute and the University of the Philippines Population Institute. The survey, which was fielded with women of reproductive age, was designed to investigate how women obtained abortions in the Philippines and the impact of unsafe abortion on women's health; the survey purposefully used the two data collection approaches to be able to cross-check and validate the accuracy of the abortion data. The 2004 CBS was both nationally and regionally representative. Comparison with the 2000 census showed that the weighted age distribution of the CBS sample was similar to that of the census, with the exception of 15–19-year-olds, who account for 11% of the CBS sample but correspond to 20% of the population according to the 2000 census. This difference is likely caused by adolescents being missed in the CBS because they were away at school and were not captured in this household-based survey. Further, the distribution of 2004 CBS respondents by selected background characteristics is quite similar to that of participants in the 2003 Demographic and Health Survey (DHS) for the Philippines. Thus, we can conclude that the overall representativeness of the 2004 CBS sample is good.

Some 4,094 women aged 15–49, both single and married, were interviewed in the CBS and then filled out the sealed envelope module. Using the 2000 Philippine census as the sampling frame, a stratified, multistage sample was designed. The sample design used a cluster approach with *barangays* (administrative units) as primary sampling units. Barangays were randomly selected; households in the selected barangays were chosen by systematic sampling, and an eligible respondent in each chosen household was interviewed.

The CBS obtained information on several topics, including the respondent's demographic and socioeconomic characteristics; her history of fertility, pregnancy and fetal loss; her knowledge, attitudes and practices regarding contraception; her experience with unintended pregnancy and abortion; and detailed information on abortion-seeking behavior and the procedure's consequences. The fact that data obtained in the SEM can be linked to data obtained in the face-to-face interview allows us to assess and compare results from these two approaches. Once we bring in data on actual levels of abortion from the AICM, we can evaluate the relative levels of underreporting in face-to-face interviews and the SEM by women's characteristics.

The specific questions asked in the first two approaches and the data used to piece together abortion incidence in the AICM are listed in Table 1 (see end of the chapter). One important objective of the CBS was to improve the reporting of unwanted pregnancies and abortions using direct questions. A battery of questions was thus designed to take the respondent through the logical steps that lead to seeking an abortion (panel A of Table 1).

The first two questions ask women whether they were ever pregnant when they did not want to be, followed by a third question asking how often this had occurred. The next four items probe the reasons why the pregnancy was unwanted and other related issues. The following question directly asks if the woman or someone else *considered* doing something to interrupt that particular pregnancy; if the answer is yes, the next question asks whether the woman or someone else ever *did or used anything* to interrupt that or any other pregnancy. Finally, a question asks how many times the woman or someone

else did something to interrupt a pregnancy. This query is followed up later with detailed questions about individual attempts and final outcomes. Although this careful line of questioning helps women recall the abortion event(s), we recognize that direct questioning about abortion in settings where it is restricted is likely to suffer from high levels of underreporting.

Panel B lists the questions that were included in the one-page, sealed envelope module administered in the Philippines in 2004, which had fewer questions than the instruments used in Colombia in 1992 (Zamudio et al, 1994; Zamudio et al. 1999) and in the Philippines in 1994 (Raymundo et al. 2001). As mentioned earlier, the idea behind shortening the questionnaire was to make it easier and faster to fill out. The sealed envelope module starts out by asking the respondent whether she had ever not carried a pregnancy to term and, if so, how many times. The next question asks whether the respondent, a doctor or anyone else did something to cause the premature termination of the pregnancy and when (with several options for expressing the date of the event). Although these four questions would have been enough to establish that a woman had had an abortion, we used three additional items that asked whether a woman had ever induced "menstruation" because Filipinos commonly use the less stigmatized word "menstruation" instead of "induced abortion." (See Appendix for full questionnaire.)

Findings from the Face-to-Face Interviews and the SEM

Of the total sample of 4,094 women aged 15–49, 618 women (15.1%) reported that they have ever had an abortion in the SEM and 65 (1.6%) reported an abortion in their personal interview (although a total of 224 personal interview respondents, or 5.5%, acknowledged having attempted to abort a pregnancy; Table 2). The nearly tenfold difference between the two approaches in the proportion of women admitting to having had an abortion clearly shows the advantage of the SEM's secrecy and anonymity over face-to-face interviews, particularly in a very conservative environment.

It should be noted, however, that several factors might have contributed to this differential, although their specific effect cannot be determined. For example, the inclusion of a probe in the SEM (whether the respondent, a doctor or someone else did anything to induce menstruation) but not in the main survey may have increased women's likelihood of reporting an abortion in the SEM. Moreover, the need to omit illiterate women from the SEM likely lowered prevalence, since these women's abortions do not contribute to overall prevalence. Another element that might have raised women's willingness to report an abortion in the SEM was asking again for their consent before starting that component.

What Characterizes Women Who Admit to an Abortion in Each Approach?

Women reporting an abortion in the SEM are quite similar to the general reproductive-age population of the Philippines with respect to educational attainment and wealth and marital status (Table 3). The only small difference is with age, as a lower proportion are adolescents compared with women in the general population. This is unsurprising, since the proportion sexually active—and thus exposed to the risk of unintended pregnancy—is much lower among adolescent women than among older women in the Philippines.

However, marked differences emerged between women reporting an abortion in the face-to-face interviews and all women in the CBS sample. For example, those admitting having had an abortion to an interviewer were older than all women in the CBS (50.3% were aged ≥35 vs. 37.5%) and they were also less educated (48.8% had elementary or less vs. 31.3%). There was little difference according to economic status. However, among women reporting an abortion in a personal interview, virtually none were single, compared with 17% who were unmarried in the general CBS sample.

Since women admitting to an abortion in personal interviews differed more from the general population than did those reporting an abortion in the SEM, the former are clearly a more selective group and thus less representative of all women who have abortions. In the Philippines, women in this more selective group tended to have comparatively little education. In contrast to the personal interviews, the SEM seemed to capture the abortions of women of all educational groups, including more educated women. The broader range of women willing to report an abortion in the SEM may stem from the method instilling greater confidence in anonymity. The important finding from the SEM is that the experience of induced abortion is not restricted to any specific subgroup of women.

Women Who Report an Abortion in One Approach but Not the Other

Assessing the level of consistency in abortion reporting across the two approaches is important, as it demonstrates the sensitivity of the two interview modes. Overall, 574 women reported an abortion in the SEM but not in a personal interview, which means that face-to-face interviews resulted in a negative positive rate of 14% (574/4,094=14.0%, Table 4). And 22 women reported having had an abortion in a face-to-face interview did not report one in the SEM, which means that the SEM's positive negative rate is only 0.5% (22/4,094=0.5%). Since

personal interviews created a far higher rate of inconsistency (14% vs. 0.5%), they appear to be a far less reliable approach of estimating abortion prevalence than the SEM.

To explore both how attempts lead to actual abortions and possible differential reporting of the two measures, the information on abortion attempts collected in the personal interviews can be contrasted with information on those women's actual abortions reported in both approaches. In their personal interviews, 224 women admitted to making an abortion attempt, but only 65 of these women said they had actually had an abortion. Of the difference of 159 women admitting an attempt but not a successful abortion in a personal interview, 45 (or 28%) reported having had an abortion in the SEM. For actual abortions, two-thirds of those reported in the personal interviews were also recorded in the SEM (43 of 65, or 66%).

Results of Abortion Prevalence from the Two Methods

Next, we combine abortion prevalence results from the two interview approaches. This analysis adds a third estimate—which we call adjusted prevalence—to take into account the unexpected finding that 22 women reported having had an abortion in a personal interview but *not* in the SEM. Since it is highly unlikely for women to overreport abortions, we add these additional 22 abortions to the total, so the overall number of abortions in the CBS sample is 640 (618 from the SEM + 22 from the personal interviews).

The three abortion prevalence rates are 1.6% based on the personal interviews, and 15.1% (unadjusted) and 15.6% (adjusted), respectively, based on the SEM (Table 5, Columns 6, 7 and 8). The patterns in abortion prevalence by age are relatively similar between the SEM and the overall sample, but the exceptions in the personal interview results reaffirms our earlier observation that women admitting to an abortion in a personal interview are a very selective group whose abortion experiences do not represent those of the general population.

Abortion prevalence rates derived from the SEM are relatively lower among younger women and increase with age, peaking at 30–34 years. Prevalence is substantially lower among 15–19-year-olds than among all other age-groups. To determine whether this finding is attributable to few young adolescent women have initiated sexual activity or to an especially high likelihood of underreporting, we restricted the analysis to sexually experienced women only. Doing so increases abortion prevalence among 15–19-year-olds nearly fivefold, but has much less of an impact on other age-groups. This indicates that although we cannot discard the possibility of underreporting altogether, the extremely low prevalence of abortion reported by adolescents is mainly attributable to their not yet being sexually active.

Results from Converting Prevalence into Incidence

Although it is clear that the SEM provides better estimates of abortion *prevalence* than the personal interviews, we do not know how the SEM and face-to-face estimates compare to external, independent estimates of abortion *incidence* that are considered to be relatively accurate. For the Philippines, an indirect estimate of abortion incidence is fortunately available for 2000, just four years before the CBS data were collected. This estimate is derived from the AICM, which calculated an annual rate of 27 abortions per 1,000 women aged 15–44 and an annual total of 473,408 induced abortions (Juarez et al. 2005). This total was constructed by applying a multiplier to the number of women hospitalized for complications of induced abortion in 2000 (78,901 women).

To assess the completeness of the estimates from the SEM and personal interviews, we need to make the measures directly comparable with the AICM estimates. Below we propose a way to convert estimates of prevalence (the proportion of women who have ever had an abortion) into estimates of rates (the number of abortions per 1,000 women per year). To approximate rates, we need to know the average number of abortions among women who have ever had an abortion. In addition, we assume that the average number of years of exposure to an abortion is equivalent to the median age of the population of women of reproductive age, minus the age at which exposure to pregnancy/abortion begins. Here we assume that age to be 15 years (which is also the beginning of the age-range that we base prevalence and incidence on). As the median age of the sampled CBS population is 31 years, the median number of years of exposure is estimated at 16 (31–15). With these two parameters in hand, we can convert abortion prevalence into an abortion rate as follows:

Estimate of abortion rates =
[(abortion prevalence * mean number of abortions among women who have ever had an abortion)/(median number of years of exposure)] * 10

The conversion requires the following steps:
(a) the percentage of women who have ever had an abortion is multiplied by the mean number of abortions among these women to obtain an estimate of the number of abortions occurring among every 100 women;
(b) the result from (a) is divided by the median years of exposure to the risk of abortion to obtain the number of abortions occurring each year among every 100 women; and

(c) the result from (b) is multiplied by 10 to provide an approximate annual abortion rate per 1,000 women of reproductive age.

However, since we lack accurate data on the average number of abortions among Filipino woman who have ever had an abortion, we propose three possible scenarios to approximate that information.

Scenario 1.
We assume no repeat abortions and that women who have ever had an abortion have only one abortion over their lifetime. This assumption generates a lower bound that corresponds to a minimum abortion rate and is likely to be an underestimate, as it is highly likely that some women will experience more than one abortion over their lifetime.

Scenario 2.
We assume that each woman who has ever had an abortion will have, on average, 1.2 abortions by the end of her reproductive years. This value, which is used by WHO in its world abortion estimates when information for a country is unavailable (Ahman and Shah 2007), takes into account the high likelihood that some women will have more than one abortion over their lifetime. This seems plausible and reasonably approximates the experience of women in the Philippines. To put the value of 1.2 into perspective, this indicator is 1.7 in the United States, based on a nationally representative survey of abortion patients (Special tabulations of data published in Jones et al. 2006).

Scenario 3.
To provide an upper bound to our estimates, we assume that each woman who has had an abortion will have, on average, 1.4 abortions over her lifetime, based on data from the 2004 CBS conducted in the Philippines.*

In addition to the three estimates of prevalence discussed so far—the face-to-face interview estimate, the SEM estimate, and the combined SEM estimate (which includes the additional abortions not reported in the SEM but reported in the personal interviews)—we discuss an additional estimate that is useful for determining the accuracy of abortion reporting. This is prevalence among women aged 30–34 years old, the age-group with the highest reported level and thus the most complete reporting of abortion. We consider prevalence among 30–34-year-olds to be the "best estimate" and discuss values generated by the combined SEM (18.3%) and the combined SEM (22.7%).

Table 6 presents a range of estimates—lifetime prevalence, annual rates and their level of underreporting relative to the AICM—for each of the three scenarios regarding the average numbers of abortions among women who have ever had an abortion (1.0, 1.2 and 1.4). The three scenarios provide useful information. Scenario 1—no repeat abortions—represents the minimum abortion rate that can be derived from the self-reported abortions in the personal interviews and the SEM; the real abortion rate would most likely be higher. Scenarios 2 and 3 can be considered more plausible for estimating more realistic abortion rates. For each of these three assumptions, we present estimates derived from the two approaches—the face-to-face interviews and the SEM (adjusted and unadjusted estimates for both all women and 30–34-year-olds only, and an average of all four SEM estimates).

Annual abortion rates derived from the personal interview data under the three scenarios range from 1.0 to 1.4 abortions per 1,000 women aged 15–44, rates that vastly underrepresent the AICM rate of 27 per 1,000 (Juarez et al. 2005). This finding reconfirms that face-to-face reporting of abortions hugely underestimates actual incidence. The annual abortion rates generated by the SEM alone range from 9 to 13 per 1,000 women of reproductive age, depending on the assumptions regarding women's average number of abortions. Once we adjust the SEM data to include the 22 positive-negatives (abortions reported in the interviews but not in the SEM), the rates for the three scenarios are slightly higher (10–14 abortions per 1,000 women per year). Likewise, if we accept that prevalence among all Filipino women most closely resembles the values among 30–34-year-olds, the rates are 12–16 abortions per 1,000 using the unadjusted SEM data, and slightly higher at 14–20 per 1,000 across the three scenarios using the adjusted SEM data.

Clearly, all 16 abortion rates derived from the SEM data (Table 6) underestimate the AICM annual rate of 27 abortions per 1,000 women. To determine the SEM's level of underreporting, we focus on the most likely prevalence (i.e., that among 30–34-year-olds) under the most plausible scenario, in which women who have had an abortion will have an average of 1.2 over their lifetime. The resulting abortion rate from the SEM alone is 13.8 per 1,000

*This assumption is based on the average number of *pregnancies* that women attempted to end among those who said they had made at least one abortion attempt in their interview. Although the socioeconomic profile of women who reported having attempted an abortion in their interview is somewhat different from that of women who reported an abortion in the SEM, the estimate of 1.4 lifetime abortions among those having an abortion is a reasonable upper bound, since it is based on real experiences reported by Filipino women.

women, and from the adjusted SEM it is 17.0 per 1,000, results that underestimate the AICM rate by 37–49%.

Finally, averaging all four SEM estimates using the assumption that women having an abortion will have a mean of 1.2 abortions gives us a more conservative annual rate of 13.5 abortions per 1,000 women aged 15–44. Thus, based on this scenario, the abortion rate derived from the SEM underestimates the AICM rate by about 50%.

Advantages and Disadvantages of the SEM

More applications of the method are needed to better understand its specific strengths and weaknesses. Nonetheless, the method has already demonstrated the following five distinct advantages in its application in the Philippines:

1) low cost of data collection when added on to an already funded survey;

2) ease of data collection;

3) ease of calculating the method's output (an estimate of the prevalence of induced abortion);

4) linkage with data from the main survey that provides background, behavioral and attitudinal characteristics of women who have had an abortion; and

5) improvement (tenfold in this application) in reporting of induced abortion over face-to-face interviews.

The method also has the following notable limitations:

1) Abortion prevalence obtained through the method still underrepresents the true level of induced abortions. In the two countries that have both SEM and AICM estimates, the Philippines and Colombia, the SEM underestimated abortions by 50% in the Philippines and by 25% (in urban Colombia). However, the level of underreporting that persists with the SEM could be different in other countries.

2) The general lack of independent, robust estimates of induced abortion in most countries makes it difficult to assess how far an SEM-generated estimate may be from the real level of induced abortion in a given country.

Conclusion

This chapter provides new evidence on self-reported abortions in a setting where the procedure is highly legally restricted and very stigmatized. Little is known about the validity of the SEM, so it is important to examine its strengths and weaknesses carefully. Comparing three approaches to estimating prevalence—the SEM, face-to-face interviews and the AICM—throws some light on the difficulty of measuring abortion in a setting where the procedure is practiced clandestinely.

A relatively large proportion of Filipino women were willing to report ever having had an abortion in the highly private SEM (15.1%), a finding that is encouraging for estimating overall abortion prevalence. As expected, the proportion of women reporting an abortion in a face-to-face interview is very low (1.6%) and these women are a selective group in terms of being better-educated than women reporting an abortion in the SEM. For the Philippines and similarly conservative environments, we do not recommend estimating induced abortion through asking women about their abortion experience in face-to-face interviews, despite the approach's advantage over the SEM in gathering more in-depth individual data on women who have abortions.

Abortion reporting using the SEM approach was more complete and thus provides a more accurate profile of women who obtain abortions in the general Filipino population. Because the method confers greater privacy and confidentiality, women from different demographic and socioeconomic characteristics appear to be willing to acknowledge that they have had an abortion.

We recommend using the SEM to estimate overall abortion prevalence and to understand how abortion is related to women's characteristics, including other fertility-related behaviors. One attractive feature of the method is that a survey does not have to be conducted from scratch but is "piggybacked" onto a survey that is already in progress. As such, an application of the SEM could be done at almost no additional time or cost. The SEM was shown to have a nearly 99% sensitivity rate, which makes it a robust method. Despite the method's advantages, however, it yields an abortion rate that underestimates the rate derived from the more accurate AICM by about 50% (13.5 per 1,000 vs. 27 per 1,000).

However, one huge advantage of the SEM over the AICM is its relative simplicity. The AICM requires a large investment of effort and money, whereas the SEM is relatively easy to implement and costs little if the module is added on to an already funded national demographic and fertility survey.

We suggest the following areas for future research:

- Further testing of the SEM is required in other countries, particularly those where AICM estimates are available to verify whether the level of underreporting in other settings is similar to that in the Philippines.
- Further methodological efforts are needed to more adequately identify the link between abortion prevalence and abortion rates, and to derive more adequate approaches and adjustments for converting prevalence into rates.
- Further exploration is needed to understand how women could become more confident in reporting an abortion in a sealed envelope module, possibly by using a qualitative approach.

The case study conducted in the Philippines shows

that the SEM approach is a methodological advance in this environment, producing better, less biased abortion estimates than those produced through personal interviews. This more accurate information is essential to guiding the formation of policies and programs to improve the prevention of unplanned pregnancy, and thereby reduce unsafe abortion. National statistical agencies should apply the SEM in demographic and fertility surveys to learn more about the level of abortion where such information is absent and desperately needed.

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TABLE 1. Questions used to estimate abortion prevalence in face-to-face interviews and sealed envelope module, 2004 CBS, Phillippines; and information used to indirectly estimate abortion incidence, 2000 AICM, Philippines

PANEL A

Face-to-face questions

Q601. Thinking back on your life, were you ever pregnant when you did not want to be?

Q602. Has there ever been any time when you were pregnant and you felt that the pregnancy would have caused difficulties for you because of your own circumstances or others' opposition to the pregnancy, even though you may have desired it?

Q603. How many times has this happened to you?

Q604. What were the reasons you did not want that pregnancy at that time?

Q606. Thinking about this pregnancy, were you or your partner using something to avoid or delay getting pregnant in the month you became pregnant?

Q607. What method(s) were you using in the month you became pregnant?

Q608. What is the order of this pregnancy?

Q609. Did you or someone else consider doing something to stop that pregnancy?

Q610. Did you or someone else ever do or use anything to stop that pregnancy or any other pregnancy?

Q611. How many times did you or someone else do or use anything to stop a pregnancy?

The following questions were asked about the most recent attempt to end the pregnancy (if a woman had made more than one such attempt):

Q629. What was the outcome of your first step to stop that pregnancy?

1 - Stopped the pregnancy but had complications
2 - Stopped the pregnancy and had no complications
3 - Did not stop the pregnancy and had complications
4 - Did not stop the pregnancy and did not have complications
5 - Did not stop the pregnancy, provider could not attend or help
6 - Did not stop the pregnancy, I could not afford the cost
7 - Other (SPECIFY): _____

And an additional question was asked to women who made more than one attempt to abort the pregnancy (after detailed questioning about those attempts):

Q637. What was the final outcome of (ALL) your attempt(s) to stop that pregnancy?

1 - Did not succeed, gave birth and had complications
2 - Did not succeed, gave birth and did not have complications
3 - Succeeded, did not give birth and had complications
4 - Succeeded, did not give birth and did not have complications
5 - Other (SPECIFY): _____

PANEL B

Sealed envelope module

1. Have you ever had any pregnancy that was not carried to full term?
2. How many pregnancies were not carried to full term?
3. Did you or a doctor or anyone else do something to cause the premature termination of your pregnancy?
4. When did this happen? Before 1995 / Between 1995 and 2000 / After 2000
5. Have you ever experienced a delay in your menstruation?
6. Did you or a doctor or anyone else do anything to induce menstruation?
7. When did this happen? Before 1995 / Between 1995 and 2000 / After 2000

PANEL C

Information needed to estimate abortion incidence, AICM

Number of hospital complications due to abortion (Hospital records data)
Number of induced and spontaneous abortions of women treated for hospital complications (Clinical data)
Proportion of women in the population likely to have an abortion (Health Professionals Survey)
Proportion of women who had an abortion likely to have a complication that requires hospitalization (Health Professionals Survey)
Proportion of women who had a complication and were treated in a hospital (Health Professionals Survey)

TABLE 2. Percentage of women aged 15–49 reporting an abortion or an abortion attempt, 2004 CBS, Phillippines

Survey method	% (N=4,094)
SEM	
% reporting had an abortion	15.1 (N=618)
Face-to-face interviews	
% reporting having ever attempted an abortion	5.5 (N=224)
% reported having succeeded in an abortion attempt	1.6 (N=65)

TABLE 3. Percentage distribution of respondents by characteristic, according to survey method, 2004 CBS, Phillippines

	All women		% (and N) reporting an abortion in SEM		% (and N) reporting an abortion in face-to-face interview	
Characteristic	%	(N)	%	(N)	%	(N)
Age (yrs.)						
15–19	10.6	433	5.9	36	8.2	5
20–24	16.3	665	15.2	94	11.6	8
25–29	17.5	717	16.9	104	10.7	7
30–34	18.2	745	22.1	137	19.1	12
35–39	16.7	682	17.6	109	17.3	11
40–45	12.5	510	14.1	87	20.8	14
45–49	8.3	341	8.2	51	12.2	8
Education						
≤ elementary	31.3	1,282	28.9	179	48.8	32
High school	47.0	1,924	49.1	304	37.6	25
College or higher	21.7	888	21.9	136	13.6	9
Wealth						
Low econ status	70.6	2,892	67.8	419	70.1	46
High econ status	29.4	1,202	32.2	199	29.9	19
Marital status						
Single	16.7	683	9.0	56	1.6	1
Marr. or consen. union	79.8	3,269	87.7	542	87.0	57
Separ., Divor., Widow.	3.5	142	3.3	21	11.4	7
Total	100.0	4,094	100.0	618	100.0	65

TABLE 4. Discrepancies between abortion data collected with face-to-face interviews and the SEM, 2004 CBS, Phillippines

Face-to-face interview	SEM				Measure of consistency
	No abortion	Yes abortion	Total	%	Positive and negative - consistency across the two sets of questions
No abortion	3,454	575	4,029	14.0	14% negative positives (did not report abortion in interview, but did in the SEM)
Yes abortion	22	43	65	0.5	0.5% positive negatives (reported an abortion in interview, but not in SEM)
				1.1	Yes in both, interviews and SEM
Total	3,476	618	**4,094**	84.4	No in both, interviews and SEM

TABLE 5. Calculation of abortion prevalence according to data collection method, among all women and among those who had ever had sex, by age-group, 2004 CBS, Philippines

	Total no. of women 15–49	No. of women reporting having had an abortion			No. of women ever had sex	% who ever had an abortion			
		Face-to-face interview	SEM	Adjusted SEM*		Face-to-face interview	SEM	Adjusted SEM*	Adjusted SEM,* sexually experienced only
	N (1)	N (2)	N (3)	N (4)	N (5)	% (2)/(1)=(6)	% (3)/(1)=(7)	% (4)/(1)=(8)	% (4)/(5)=(9)
5-year age-group									
15–19	433	5	36	41	106	1.2	8.4	11.4	38.9
20–24	665	8	94	97	505	1.1	14.2	17.5	19.2
25–29	717	7	104	105	656	1.0	14.5	17.6	16.1
30–34	745	12	137	141	716	1.7	18.3	22.7	19.7
35–39	682	11	109	110	665	1.7	15.9	19.4	16.6
40–45	510	14	87	91	504	2.7	17.1	21.5	18.1
45–49	341	8	51	54	328	2.3	14.9	18.9	16.4
Total 15–49	4094	65	618	640	3480	1.6	15.1	15.6	18.4

*Adjusted to include the 22 women who reported an abortion during their personal interview but not on the SEM questionnaire, assigned to their corresponding age-group.

TABLE 6. Comparison of estimates of abortion prevalence and rates, by assumptions for average numbers of abortions among women who have had an abortion (1,1.2 and 1.4); and level of underreporting of abortion rates relative to the AICM value of 27 per 1,000; all according to interview approach

	Abortion prevalence (% of women who have ever had an abortion)			Annual abortion rate (no. of abortions per 1,000 women) estimated from prevalence			% of underreporting relative to AICM rate of 27 abortions per 1,000 women		
	Assumption regarding average number of abortions among women who ever had an abortion								
Data collection approach	1.0 abortion	1.2 abortions	1.4 abortions	1.0 abortion	1.2 abortions	1.4 abortions	1.0 abortion	1.2 abortions	1.4 abortions
Face-to-face interview	1.6	1.9	2.2	1.0	1.2	1.4	96.3	95.6	94.8
SEM									
All women of reproductive age									
Unadjusted	15.1	18.1	21.1	9.4	11.3	13.2	65.0	58.1	51.1
Adjusted*	15.6	18.7	21.8	9.8	11.7	13.7	63.9	56.7	49.4
30–34-year-olds (considered best estimate for all women)									
Unadjusted	18.3	22.0	25.7	11.5	13.8	16.0	57.6	49.1	40.6
Adjusted*	22.7	27.3	31.8	14.2	17.0	19.9	47.4	36.9	26.3
Average of all four SEM estimates	**17.9**	**21.5**	**25.1**	**11.2**	**13.5**	**15.7**	**58.5**	**50.2**	**41.9**

*Adjusted to include the 22 women who reported an abortion during their personal interview but not on the SEM questionnaire, assigned to their corresponding age-group.

Notes: The assumption of an average of 1.2 abortions among women who have ever had an abortion comes from Ahman and Shah (see references). The assumption of an average of 1.4 abortions among women who have ever had an abortion is equivalent to the average number of pregnancies that women reported attempting to terminate in their face-to-face interview. Conversion of prevalence into rates used the median number of years of exposure to the risk of pregnancy—the median age of women in the 2004 CBS sample (31 years) minus the median age at first sex (age 15) = 16 years of exposure.

APPENDIX

a) First request for informed consent—at start of personal interview.

INTRODUCTION.

We are undertaking a survey among women in this community about unwanted pregnancy because it has been a great problem in our country and the whole world. Unwanted pregnancy is a very important problem needing solutions because of impairing effects on the health, well-being and future fertility of women and teenage girls.

We urge you to become our partners in solving unwanted pregnancy through the information you provide. Your help is very important in enabling us to have a better understanding and picture of this problem in our country. The results of this study will help us develop appropriate ways of addressing the problem and plans for better reproductive health services.

You provide us information in two ways:

I, the interviewer ask you questions; and

you fill the answers yourself to the questions in this piece of paper.

Your views on these issues are very important and we would be very grateful for your cooperation. We assure you that any information you provide will be:

strictly confidential; and

used for research purposes only and will never be used against you.

Your participation is voluntary, and you may stop the interview at any time. Do I have your permission to continue?

1 - Yes

2 - No

[If yes] I certify that the respondent has given permission to conduct the interview with her.

Interviewer's signature: _____

b) Second request for informed consent—at end of personal interview before initiating self-administered, sealed envelope questionnaire.

The part of this survey in which I ask you questions is complete. We will now move to the self-administered section. This is a piece of paper with some questions for you to read and answer yourself. Many women may feel more comfortable answering these questions this way. When you finish filling in the page, please put your answers in this envelope and seal it. This sealed envelope will remain closed until it is sent to our central office. I would like to remind you that **any information you provide will be strictly confidential and your name will not be linked to your answers. Do I have your permission to continue?**

*[*ONLY FOR LITERATE WOMEN. *GIVE RESPONDENT THE SELF-ADMINISTERED SECTION AND A PEN. IF SHE IS UNABLE TO READ AND WRITE OR DOES NOT WANT TO COMPLETE THE SELF-ADMINISTERED PART, END THE INTERVIEW HERE AND THANK HER.]*

That is the end of my questions, and I want to thank you for your help on this important project.

807. FILTER – LITERATE AND ILLITERATE WOMEN V807 ☐

ILLITERATE WOMEN (IF SECTION 1, Q108 and Q109 answers No=Code 2)

1 ➔ ***[FINISH THE INTERVIEW AND THANK THE RESPONDENT:***

That is the end of my questions, and I want to thank you for your help on this important project]

Iyon na po ang katapusan ng aking pagtatanong at ako po ay nagpapasalamat sa inyong tulong sa importanteng proyektong ito.

LITERATE WOMEN (IF SECTION 1, Q108 and Q109 answers ≠ Code 2)

2 ➔ ***[CONTINUE]*** ↓

IDENTIFICATION	☐☐☐☐☐

SELF ADMINSTERED PART OF THE QUESTIONNAIRE. Please read carefully and write answers to the following questions or tick the appropriate answer. Once you complete the questions please place your answers in the envelope and seal it.	***DO NOT FILL – UP THE SHADED PART***
1. Have you ever had any pregnancy that was not carried to full term? ○ Yes ○ No ➔ ***[GO TO QUESTION 3]***	SAQ1 ☐
2. How many pregnancies were not carried to full term? NUMBER: ___ ___	SAQ2 ☐☐
3. Did you or a doctor or anyone else do something to cause the premature termination of your pregnancy? ○ Yes ○ No ➔ ***[GO TO QUESTION 5]***	SAQ3 ☐
4. In what month and year did this happen? ***[REFER TO THE LAST HAPPENING. WRITE WHAT YOU REMEMBER, YEAR OR MONTH OR MONTH AND YEAR]*** Month : ___ ___ Year : ___ ___ ___ ___ ***IF YOU CANNOT REMEMBER MONTH AND YEAR, PLEASE CHECK THE APPROPRIATE PERIOD WHEN THIS HAPPENED.*** ○ Before 1995 ○ Between 1995 and 2000 ○ After 2000	SAQ4m ☐☐ SAQ4y ☐☐☐☐ SAQ4a ☐
5. Have you ever experienced a delay in your menstruation? ○ Yes ○ No	SAQ5 ☐
6. Did you or a doctor or anyone else do anything to induce menstruation? ○ Yes ○ No	SAQ6 ☐

7. In what month and year did this happen? ***[REFER TO THE LAST HAPPENING.]***

Month : ___ ___

Year : ___ ___ ___ ___

IF YOU CANNOT REMEMBER MONTH AND YEAR, PLEASE CHECK THE APPROPRIATE PERIOD WHEN THIS HAPPENED.

- ○ Before 1995
- ○ Between 1995 and 2000
- ○ After 2000

SAQ7m ☐☐

SAQ7y ☐☐☐☐

SAQ7a ☐

CHAPTER 9

Data Triangulation: Using Multiple Methods To Estimate and Validate Abortion Incidence and Prevalence

Heidi Bart Johnston, Diana Lara, Silvia Mario and Edith Pantelides
(Coordinators: Diana Lara and Sandra G. Garcia)

This volume describes a wide range of data collection methods that have been used to estimate abortion incidence, prevalence, mortality and morbidity in different settings around the world. Since each of these methods has its limitations, there are advantages to using two or more research methods to triangulate findings and cross-check results for consistency. The use of multiple methods can enhance confidence in overall conclusions and offset the biases or shortcomings of any single method. This strategy is useful in both developed and developing countries, as well as in restrictive and liberal legal settings. Indeed, in all settings and situations, highly stigmatized events such as induced abortions are likely to be underreported, which makes assessing their true magnitude especially challenging and the advantages of triangulation particularly compelling.

Different methods of measuring abortion have contrasting reliability and validity. Reliability refers to whether the methodology generates consistent results when used by other researchers in similar settings, whereas validity refers to the extent to which a given methodology actually measures what it is intended to measure. For example, indirect estimation techniques based on hospital abortion statistics may be more reliable at estimating abortion incidence (or prevalence) than either direct estimation techniques (i.e., face-to-face surveys) or data collected through other indirect methods (such as the Randomized Response Technique [RRT] or computer-assisted self-administered surveys), some of which can be more costly and difficult to field than hospital-based estimation methods.

As noted above, the validity of study findings is strengthened when two or more methods for measuring the same construct or phenomena yield mutually reinforcing results. Whenever possible, researchers should weigh the pros and cons of different methods and choose one that will yield the most reliable results. If possible, the results of a study should be compared and contrasted to (triangulated with) other similar studies to improve their validity.

Studies that use two or more distinct estimation methodologies are particularly valuable to better measure and understand the often stigmatized, clandestine nature of induced abortion. An example of such an approach is the Abortion Incidence Complications Method (AICM, see Chapter 6), in which postabortion hospital admissions data are complemented by data obtained from surveys of health professionals. While admissions data provide information about abortion complications that are treated in hospitals, the survey data shed light on the proportion of abortions that cause serious complications and the likelihood that women who develop complications requiring facility-based care will receive it. Data gathered from both methods are combined to indirectly estimate rates of induced abortion in a country (Singh and Wulf 1994).

Another example of a mixed-method approach is the use of information from different sources to understand the effect of illegal misoprostol use on hospital admissions from abortion complications (see Chapter 14). Data obtained using quantitative methods such as national-level surveys of women, Health Professionals Surveys (HPS) and annual misoprostol sales are combined with findings obtained from a mystery client study in which trained interviewers act out different scenarios in which they request abortifacient medications in pharmacies (Lara et al. 2007). The information from the four methodologies is combined to confirm or validate an indirect estimate of the proportion of hospitalized postabortion cases that can reasonably be attributed to misoprostol use.

In countries that have accurate abortion reporting systems, data obtained from direct estimation methodologies, such as face-to-face interviews or audio computer-assisted self-interviews (ACASI) can be validated against data from existing reporting systems and from other approaches, such as surveys of abortion providers (Fu et al. 1998; Jones and Kost 2007). In settings where official statistics on abortion are scarce, multiple methodologies can be applied to obtain a range of estimates that, when taken together, are more likely to be closer to "reality" than any one method alone. This volume contains many examples of using multiple methods to validate results (see also Chapters 4, 5 and 8). Below we—with the collaboration of the researchers involved in three cases—summarize findings from several studies in which researchers used multiple methods to validate estimates of abortion incidence. Each section presents information about the accuracy of

the estimates that resulted from the application of each method, as well as its advantages and disadvantages.

Part I. Direct Estimates vs. Indirect Estimates Using the Residual Technique, Bangladesh

Heidi Bart Johnston

Johnston (2007) used data from ICDDR,B's Matlab study area in rural Bangladesh to compare direct estimates of abortion rates with indirect estimates obtained from the residual estimation technique based on rearranging the Bongaarts proximate determinants of fertility model (see Chapter 4). The data sources for the direct estimates were the following three face-to-face surveys: 1) an Abortion Frequency Survey (AFS) conducted with a stratified random sample of 909 women in the Matlab area in 1997; 2) the Matlab Demographic Surveillance System (DSS), a longitudinal study conducted in the Matlab area since the mid-1960s; and 3) the cross-sectional, Matlab Demographic and Health Survey (MDHS), a DHS-like survey that was conducted among 3,225 women in 1994. The DSS and the MDHS also provided the data needed to calculate the residual estimates. The investigator compared direct and indirect (residual) estimates of abortion rates for three areas: the total Matlab study area, and two areas within the Matlab study area—the area exposed to ICDDR,B's Maternal Child Health–Family Planning (MCH-FP) intervention; and a comparison (control) population.

Table 1 compares the 1997 AFS direct estimates with all others—direct estimates from the 1994 MDHS, and the 1994 and 1996 DSS, and indirect residual estimates calculated using the 1994 MDHS, and the 1994 and 1996 DSS (see all tables at the end of the chapter). When comparing the three direct estimates of abortion rates for the total Matlab area, Johnston found that the AFS generated notably different estimates compared with the DSS or the MDHS. For example, DSS data for 1989–1996 produced a consistent rate of just under five abortions per 1,000 women during this time period, but the MDHS produced a range of rates, from 0.3 abortions per 1,000 women in 1989 to 2.1 in 1993 (not shown). The AFS rates resembled those of the DSS until 1996, when the AFS estimate increased to 14.4 abortions per 1,000 women and ultimately rose to 23.6 abortions per 1,000 women in 1997, when the survey was conducted. The variability in the three direct estimates suggests that none is precise.

However, the high AFS rate of 23.6 per 1,000 women in 1997 is thought to be closest to the true abortion rate. Four major justifications support this thinking. First, the protocol has an abortion-specific focus and was developed and implemented based on lessons learned from previous abortion survey research methodologies and from qualitative research findings on abortion in the Matlab area. In contrast, in the DSS and MDHS, abortion is one of many demographic and health topics covered. Second, respondents are unlikely to overreport stigmatized events such as abortion; support for this comes from informants (who were also DSS respondents) who reported concealing menstrual regulation procedures and abortions in the DSS. Third, the most recent rates of abortion from the AFS (1997) would have been less affected by recall bias, and possibly also by inaccurate reporting, compared with earlier AFS estimates. And fourth, though the AFS rates appear high compared with rates generated by the other direct surveys implemented in Matlab, an annual rate of 23.6 abortions per 1,000 women is just below the range of 26–30 estimated for Bangladesh by Singh and colleagues in 1997 (Singh et al. 1997). This rate is also well within the bounds of rates in other countries that have reputable provider registration systems (e.g., it is virtually identical to the 1990 rate in the United States and Singapore, to name just two) (United Nations 1995).

Moreover, the direct 1997 AFS estimates and the residual estimates based on the 1996 DSS are quite similar for both the total study area and the comparison area, but they diverge for the MCH–FP area. For all three areas, abortion rates calculated from the residual technique based on 1994 MDHS data are much higher than rates derived from the 1997 direct estimates. This finding likely results from the MDHS data underestimating the fertility-reducing effects of delayed marriage and contraceptive use, which shows the method's sensitivity to inaccurate data. For example, for 1994, levels of modern contraceptive use were measured as 14% lower in the MDHS than the DSS for the same population, and the MDHS total fertility rates were 5% higher than the DSS rates. Interestingly, the application of the residual model to 1994 DSS data yielded a negative abortion rate in the MCH–FP intervention area, a clearly erroneous finding very likely caused by overreporting of one of the principal proximate determinants in the DSS.

Johnston concludes that while the residual technique can yield moderately accurate estimates of abortion rates, it is critical that inputs are of high quality because the model is very sensitive to fluctuations in data. Indeed, small variations or inaccuracies in the components of the residual estimation model can cause wide variation in the resulting estimate (see Chapter 4 for more information about the data used in the model). The method is useful in contexts where researchers are confident that the available data are of high quality, but because the indirect residual method yields such varying rates, it is difficult to know if the instances of agreement between the direct

and indirect estimates are a reflection of reality or are due to chance.

Part II. Face-to-Face Interviews vs. ACASI, United States

Diana Lara

As of 1974, the Guttmacher Institute has periodically conducted a survey of abortion providers in the United States to calculate the numbers of abortions and their geographic distribution (Jones 2008). Since 1973, the National Center for Health Statistics has periodically collected data on unintended pregnancy—the demand side of the abortion equation—through the National Surveys of Family Growth (NSFG). Each NSFG collects information from women about their reproductive behavior, including the numbers of unwanted pregnancies and abortions.

To encourage reporting on sensitive issues, the 1995 NSFG introduced an innovative, private self-administered component—ACASI—at the end of the main interview. With the ACASI component, women listened to the questions over audiotape or read them on their computer screen in private, and responded directly by typing answers into a laptop. For this segment of the NSFG interview, women were invited to answer questions on sensitive topics, such as their lifetime experience of abortion, including any abortions that they had already mentioned to an interviewer.

Fu and colleagues (1998) conducted a study to compare the incidence of abortion calculated from the 1995 NSFG—either from face-to-face or self-administered interviews—with the actual incidence of abortion derived from a Guttmacher census of abortion providers who performed abortions between 1991 and 1994. The authors also compared the completeness of abortion reporting in the 1995 NSFG main face-to-face interview against the then new ACASI method.

Unsurprisingly, Fu and colleagues found that the type of data collection approach yielded different abortion estimates. Compared with the number of abortions performed from 1991 to 1994, 45% of actual abortions were reported with NSFG face-to-face interviews, 52% with ACASI and 59% when both methods were combined. The percentage of actual abortions that were reported by each method also varied by women's characteristics: With both interview methods combined, the NSFG captured only 40% of abortions among women below the poverty level but 75% of those among women at ≥200% of poverty. Similar large differentials in reporting completeness emerged by women's age, current marital status and race.

As hypothesized, women in the NSFG generally reported their abortion experience more completely with ACASI than with face-to-face interviews. However, ACASI alone did not yield the fullest count of abortions, as there were some cases where women revealed their abortion history in the face-to-face interview but not in the private, computer-aided interview: Of a total of 3,843 abortions reported by women in the NSFG sample, 58% were reported in both types of interviews, while 15% were reported in the personal interviews only and 27% in the ACASIs only. For the 1991–1994 study period, the inclusion of data collected by ACASI increased the level of abortion reporting across all subgroups (for example, by age, religion and geographic residence). Overall, the level of abortion reporting was 31% higher when the two data sources were combined compared with when only face-to-face data were considered. In sum, the combined findings from both methods yielded a more complete count than did either method alone.

Jones and Kost (2007) conducted a similar study to measure the extent of abortion underreporting in the NSFG by comparing abortion incidence from the Guttmacher survey for 1999–2001 with women's reports from the 2002 NSFG. Of the estimated 6.5 million induced abortions among women aged 15–44 between 1997 and 2001, only 47% (95% confidence interval, 40–55%) of these abortions were reported in the face-to-face interviews of the 2002 NSFG. Like the previous study, the authors found that the ACASI component of the NSFG increased the level of abortion reporting, since 15% more women reported having had an abortion in an ACASI than in a face-to-face interview (1,402 women reported an abortion in a self-administered interview, compared with 1,218 women in a face-to-face interview). This finding led the authors to conclude that most underreporting can be attributed to an unwillingness to acknowledge having had an abortion.

Jones and Kost also examined abortion reporting by length of gestation, a previously unexplored issue. They found that just 37% of abortions that occurred before nine weeks were reported, with the proportion reported increasing with length of gestation. Among second trimester abortions, 85% were reported.

As with the Fu and colleagues study, Jones and Kost found that levels of abortion reporting varied among subgroups of women. As in the 1995 NSFG, Hispanic, black and lower-income women were among the least likely to report their experience of abortion. Abortions among adolescents and women older than age 35 were more likely to be reported, but abortions that women experienced in their 20s were less likely. Married women were also more likely to report abortions. The fact that the same subgroups of women consistently underreported their abortion experience across the two surveys suggests that women's characteristics are reliable predictors of whether they will report having had an abortion.

For both studies that compared NSFG data with external numbers of abortions, the potential limitations of the methodology that generated those external numbers are worth noting. Even though the Guttmacher provider census is considered the most comprehensive source of abortion statistics in the United States, the data are still not totally complete. Guttmacher investigators have calculated a level of abortion underreporting in their provider survey of approximately 3–4% due to a small number of unlisted providers. Other investigators, however, have suggested that the Guttmacher estimates might be inflated because of provider overreporting and because a small proportion of the reported abortions is estimated or projected (Michael 2001).

Both the 1995 and 2002 NSFG surveys found that using a self-administered, private computer-assisted survey increased the reporting of abortions compared with using face-to-face interviews. However, underreporting will always be an issue. As Fu and colleagues noted with their evidence from the 1995 NSFG, apparently not all respondents trust the ACASI method and privacy alone does not ensure that women will be willing to report an abortion. Also, respondents with lower literacy levels or language barriers might face difficulties answering the questions on their own. This reluctance is likely due to the ongoing stigma surrounding abortion, even in legal contexts such as the United States.

However, as was observed in the analysis using the 2002 NSFG, despite supposed greater stigma surrounding second-trimester abortions, such later-term abortions were reported more often than were first-trimester abortions. Jones and Kost suggest that second-trimester procedures, which involve obvious medical intervention, are less likely than earlier abortions to be unreported or denied. Alternatively, second-trimester abortions are usually performed for medical reasons and this in turn suggests that women may be more willing to disclose such medically justified procedures.

Part III. AICM vs. the Residual Technique, Argentina

Siliva Mario and Edith Pantelides

Because induced abortion is severely legally restricted in Argentina, no official records of its practice are available. Faced with this lack of data, Pantelides and Mario used two methods to obtain a range of estimates within which the actual number of abortions could lie (Pantelides and Mario 2007). The best-suited methods to the Argentinean situation are a combination of the AICM developed by Singh and Wulf (1994) and described in Chapter 6, with the residual method reviewed extensively by Johnston and Hill (1996) and described earlier in this chapter and in Chapter 4. Pantelides and Mario used each method to calculate four sets of estimates—two using the AICM (estimates A and B) and two using the residual method (estimates C and D).

For the hospitalization data component needed to apply the AICM, the records of postabortion inpatients in public hospitals for the year 2000 (the most recent available) were used. The two sets of AICM data incorporated different assumptions of the quality of the postabortion hospitalization data. Estimate A assumed that the discharge data were of acceptable quality and did not need to be adjusted, whereas estimate B adjusted them for quality issues, such as the misclassification of induced abortion cases, as suggested by Singh and Wulf (1994). Both estimates, however, adjusted for the omission of private hospitals from official hospital discharge data.

To calculate the total number of abortions occurring in the country, the proportion of abortions that the discharge data represent has to be multiplied by a factor that reflects, among other things, the likelihood that certain types of abortions will lead to complications and the likelihood that women will seek and receive hospital care for them. The data needed for this multiplier came from an HPS, which was implemented between November 2005 and March 2006. A total of 30 interviews were conducted in a range of settings, including the Buenos Aires Metropolitan Area and the cities of Rosario (Santa Fe province), Mendoza (Mendoza province), Córdoba (Córdoba province), Tucumán (Tucumán province) and Resistencia (Chaco province).

A national multiplier was estimated as the weighted average of multipliers that were calculated separately from HPS data for poor and nonpoor women (see Chapter 6), since poor women are more likely than nonpoor women to develop complications, and less likely to seek and receive care for them. The total number of abortions was calculated as the product of the numbers of hospitalized postabortion patients times the multiplier (see Table 2).

For the estimates based on the residual technique, data were obtained from the Encuesta Nacional de Nutrición y Salud, ENNyS (National Survey on Nutrition and Health), which was conducted in 2004–2005 in localities with at least 5,000 inhabitants, and from vital statistics data and population projections. The two sets of estimates generated by the residual technique used different values for the C_i (index of postpartum insusceptibility): Estimate C used the average duration of breastfeeding, whereas Estimate D used the median duration of breastfeeding.

The four estimates of the annual number of induced abortions in Argentina for roughly 2000–2005 (A, B, C and D) range from approximately 372,000 to 522,000, and the abortion rate ranges from 41 to 65 per 1,000 women of re-

productive age. This wide range may be explained by the appropriateness of the methods used and by the quality and availability of the data.

In this example, both estimation methods can potentially underestimate the number of abortions because of biases in the data. For example, the HPS data used to estimate the multiplier were biased by the make-up of the sample, which was predominantly physicians, who tend to overestimate the probability that illegally induced abortions will result in complications requiring hospitalization. Such an overestimate would lower the multiplier (i.e., the lower the multiplier the less safe the conditions of abortion), so the overall number of abortions based on hospitalization data would also be lower.

Furthermore, because a growing number of women are likely incorrectly using misoprostol for self-induced abortions, an unknown number are probably presenting at emergency rooms with bleeding because they have not been properly informed about the drug's normal mechanism of action. Most of these women are treated in the emergency room and thus are not included in the hospital discharge data.

The residual estimation technique may also have yielded underestimates for abortion incidence, as the data used for residual estimation were not nationally representative: The estimate relied on reproductive health data from the ENNyS, which was conducted in localities with at least 5,000 inhabitants. Thus, the number of abortions is limited to these areas, which represent 84% of the total population of Argentina. It would be expected that the total number of induced abortions for the whole country is larger. Moreover, the input data for the contraception index were of moderate quality at best, since country-specific data on contraceptive use–effectiveness for each method were unavailable for Argentina, and researchers had to use standard values from the World Health Organization.

To evaluate which one of the four estimates is closest to the real number of abortions that take place in Argentina each year, we need a sense of where that value currently lies.* Since it is impossible to directly measure the incidence of induced abortion in Argentina, these sets of estimates need to be replicated or another methodology should be tried to determine which result is the most accurate.

Part IV. Comparison of Four Interview Techniques to Measure Abortion Prevalence, Mexico

Diana Lara

In Mexico in a pilot study in 2001, researchers combined four methods to estimate abortion prevalence: face-to-face interviews, ACASI, self-administered questionnaires that were to be placed in a ballot box and RRT (Lara et al. 2004). (For details of the RRT study that resulted from this pilot, see Chapter 5.) The pilot was conducted with the following three populations and settings: 1) convenience sample of 1,480 patients in Mexico City who were recruited in waiting rooms from three public hospitals; 2) convenience sample of 612 women from the rural state of Chiapas who were recruited from adult literacy programs, health care facilities and local markets and parks; and 3) a simple random sample of 1,000 women aged 15–55 who were participating in a household survey in Mexico City. In each setting, participants were randomly assigned to be interviewed using one of the four methodologies.

The face-to-face interviews consisted of 34 questions about women's social, demographic and reproductive characteristics (including their history of unwanted pregnancies, induced abortion attempts and results of those attempts). For the ACASIs, researchers adapted the content and order of questions in the face-to-face interview to make them more compatible with the technology. For the questionnaires used in RRT, researchers eliminated the direct questions about abortion, which resulted in a shorter questionnaire of just 18 items. When women finished filling it out, they were asked the randomized response question using the following procedure: The interviewer held out two folders, one red and one green (with the color coding intended to help low-literacy women). The red folder contained a sheet of paper with a red dot and the question, "Did you ever try to interrupt a pregnancy?" The words "yes" and "no" were printed below the question. The green folder contained a sheet of paper with a green dot and the question, "Were you born in April?" Again, the words "yes" and "no" were printed below.

The interviewer then asked the participant to fold the sheets into the same shape, so it would be impossible to identify one from the other, and place them in an opaque bag. The interviewer shook the bag and asked the woman to pull out one folded sheet of paper. The participant then unfolded her chosen paper and read the question silently to herself. The interviewer did not know which question the participant had chosen to answer. The woman said her answer out loud, either "yes" or "no," and the interviewer recorded the woman's response. This technique

*The only prior estimate of the number of induced abortions in Argentina was calculated for 1991 by Aller Atucha and Pailles. That number ranged between 451,000 and 498,000. However, given the substantial changes in contraceptive method mix and reproductive behavior since then we cannot compare current estimates with the earlier one. (*Source:* Aller Atucha LM and Pailles J, *La práctica del aborto en Argentina: actualización de los estudios realizados, estimación de la magnitud del problema,* Buenos Aires 1996, <http://www.pensamientopenal.com.ar/44aborto.pdf>, accessed Oct. 13, 2009.)

allowed researchers to calculate the proportion of women responding affirmatively to the abortion question using the two known probabilities—that of selecting the sensitive question about abortion (0.5) and that of responding "yes" to having a birthday in April (0.085).

In the two convenience samples, RRT yielded the highest proportion of respondents who reported attempting to interrupt a pregnancy (22% in Mexico City and 36% in Chiapas, respectively) and the self-administered questionnaire yielded the second highest (19% in Mexico City and 10% in Chiapas, respectively) (see Table 3). The last two interview techniques yielded the lowest prevalence in both convenience samples—10–13% with ACASI and 11–12% with face-to-face interviews.

Application of RRT with the Mexico City household sample revealed that 18% of respondents had attempted an abortion, with a 95% confidence interval of 11.2–24.6%. With the self-administered questions, the prevalence was 11%, whereas ACASI and the face-to-face interviews produced abortion-attempt prevalence rates of 9% and 7%, respectively.

In summary, in each of the three samples, RRT obtained the highest prevalence of attempts of induced abortion (22% in the Mexico City hospital sample, 36% in the rural sample and 18% in the Mexico City household sample), followed by the self-administered questionnaire (19%, 10% and 11%, respectively). The ACASI and face-to-face interviews yielded fewer reported abortion attempts. Each of the methods showed strengths and limitations, which are summarized in Table 4.

Chapter Conclusions

The use of data triangulation to estimate and validate abortion prevalence is a useful practice in a variety of legal, social and cultural settings, as demonstrated by the studies described in this chapter. Triangulation helps researchers determine which methodologies yield the most accurate estimates, while it also sheds light on the appropriateness of using certain methods in a given setting or a given population. For example, abortion-specific, face-to-face interviews may yield more accurate estimates of abortion in Bangladesh, but be less effective in countries such as Mexico, where abortion-related stigma and religious opposition to the practice is likely stronger. In addition, the use of complex procedures such as ACASI or RRT among less-educated (or low-literacy) and rural populations may be too confusing, and thus yield less accurate information. Conversely, in the United States, information obtained with ACASI proved more accurate than that obtained through face-to-face interviews.

However, combining face-to-face data with ACASI-collected data yields the most complete measure of abortion prevalence in the United States. The importance of considering both data sources when calculating estimates is clear: Even though larger proportions of abortions were reported using the more confidential technique, some abortions were still reported only in face-to-face interviews.

Although the use of methods that increase anonymity and privacy has improved reporting of abortions, roughly half of abortions still go unreported with direct surveys of women in the United States. In settings where data from abortion providers are unavailable, or where the AICM cannot be used because hospital statistics are of poor quality and a survey to collect these data is not feasible, research will need to rely on data from direct surveys of women. In these situations, efforts need to be made to detect and reduce underreporting as much as possible, for example, through using ACASI or variations on private, direct survey techniques.

The practice of abortion in all parts of the world continues to evolve, and as new technologies influence the safety of abortion and perhaps levels of complications, the use of multiple methods to estimate prevalence and incidence becomes even more critical. For example, we need to better understand the impact of misoprostol on safe abortion incidence and also on possible increases in hospital treatment for postabortion complications among women who are unfamiliar with the way the drug works. In addition, in many relatively unrestricted settings, measures of abortion incidence that are based on official statistics may be incomplete if some providers do not report or provide only partial data to health reporting systems.

Given that abortion is a controversial issue and its incidence and prevalence are difficult to measure and validate, multiple sources of data are needed from more than one estimation technique or method. Combining findings from qualitative, quantitative, direct and indirect methodologies allows researchers to refine estimates and produce more credible findings to serve as critical inputs for reproductive health policies and advocacy strategies.

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TABLE 1: Comparisons of annual .abortion rates derived from direct and indirect estimation techniques, Matlab, Bangladesh

Data source and area	Abortion rate per 1,000 women
Direct 1997 AFS	
Total Matlab study area	23.6
MCH–FP area	9.6
Comparison area	39.6
1994 MDHS	
DIRECT	
Total Matlab study area	1.5
MCH–FP area	u
Comparison area	u
RESIDUAL	
Total Matlab study area	56.3
MCH–FP area	38.0
Comparison area	80.0
1994 DSS	
DIRECT	
Total Matlab study area	4.3
MCH–FP area	2.2
Comparison area	6.8
RESDIUAL	
Total Matlab study area	22.0
MCH–FP area	–3.4
Comparison area	54.9
1996 DSS	
DIRECT	
Total Matlab study area	4.3
MCH–FP area	2.8
Comparison area	6.1
RESIDUAL	
Total Matlab study area	22.0
MCH–FP area	2.0
Comparison area	41.7

u = unavailable. *Source:* Johnston 1999.

TABLE 2: Estimates of the annual number of induced abortions and related indicators according to estimation technique, Argentina, 2000–2005

Method of abortion estimation and individual estimate		Year	No. of induced abortions	Ratio of induced abortions to live births	Induced abortion rate per 1,000 women aged 15–49	Total abortion rate*
AICM	A	2000	446,998	0.64	49.0	u
	B		371,965	0.53	40.8	u
Residual method†	C	2004–2005	485,974	u	60.8	2.13
	D		522,216	u	65.4	2.29

*Average number of lifetime induced abortions per woman that a hypothetical cohort would have, assuming no mortality and no change in age-specific abortion rates.

†Based on women residing in cities of 5,000 inhabitants or more, which represent 84% of the total population and 96% of the urban population of Argentina.

Notes: Estimate A uses unadjusted hospitalization data; B adjusts hospitalization data for the misclassification of induced abortion cases; C uses the average duration of breastfeeding for the index of postpartum insusceptibility; and D uses the median duration of breastfeeding for the index of postpartum insusceptibility. u = unavailable.

Sources: Ministerio de Salud de la Nación, Dirección de Estadísticas de Salud, Serie 5, *Estadísticas vitales, correspondientes al año 2000*, Instituto Nacional de Estadística y Censos (INDEC), population projections and estimates, <www.indec.gov.ar>, accessed Sept. 20, 2006; and Ministerio de Salud de la Nación, Encuesta Nacional de Nutrición y Salud (ENNyS), unpublished tables.

TABLE 3: Proportions of respondents reporting having had an unwanted pregnancy and having attempted an induced abortion in three study populations, by methodology, Mexico, 2001

Sample and outcome	Methodology				
	RRT	SAQ	ACASI	FTF	p-value*
CONVENIENCE					
Mexico City	**(N=370)**	**(N=369)**	**(N=370)**	**(N=371)**	
% had an unwanted pregnancy	38	34	34	34	0.556
% attempted an abortion	22†	19	13	12	0.012
Chiapas	**(N=103)**	**(N=313)‡**	**(N=91)**	**(N=105)**	
% had an unwanted pregnancy	33	27	21	31	0.270
% attempted an abortion	36†	10§	10	11	0.908
HOUSEHOLD (Mexico City)	**(N=250)**	**(N=250)**	**(N=250)**	**(N=250)**	
% had an unwanted pregnancy	27	27	26	26	0.996
% attempted an abortion	18†	11	9	7	0.438

*Based on chi-square analyses conducted between the three direct-question methods only.
†Based on women who answered "yes" to the randomized response question.
‡The N used to calculate rates of attempted abortion in Chiapas was 278 because 35 women did not answer this question and were removed from the sample.
§Includes data from 121 illiterate women for whom the self-administered questionnaire was unsuccessful. When these women are excluded, the proportion reporting having attempted abortion is 12%. Includes data from one woman who did not answer the question on abortion attempts, but indicated to an interviewer as she returned her completed questionnaire that she had had a successful abortion.

Note: RRT = randomized response technique; SAQ = self-administered questionnaire; ACASI = audio computer-assisted self-interview; and FTF = face-to-face interviews.

Source: Lara et al. 2004.

TABLE 4: Strengths and weaknesses of four methodologies for estimating abortion prevalence in Mexico, 2001

Method	Findings	Strengths	Weaknesses
RRT	Highest reported prevalence of unwanted pregnancies and attempted abortions in all study samples	- Very confidential - Appears to overcome women's reluctance to report abortion attempts	- Does not permit analysis of individual responses - Requires twice the sample size to obtain the same power - Does not allow for collection of detailed information about abortion - Questionable reliability and validity among populations of lower education levels
SAQ	Second highest prevalence of unwanted pregnancies and attempted abortions in all study samples	- Less expensive - Confidential - Obtains detailed information about abortion	- High item nonresponse rate - Questionable reliability and validity among populations of lower education levels
ACASI	Low prevalence of attempted abortions in all study samples. High prevalence of unwanted pregnancies	- Confidential - Obtains detailed information about abortion - High item response rate	- Security problems - Expensive - Questionable reliability and validity among populations of lower education levels
FTF	Low prevalence of attempted abortions in all study samples. High prevalence of unwanted pregnancies	- Very detailed information about abortion - High item response rate	- Expensive - Less private - Women's reluctance to report abortion attempts in front of an interviewer

Source: Lara et al. 2004.

CHAPTER 10

Prospective Approach to Measuring Abortion-Related Morbidity: Individual-Level Data on Postabortion Patients

Tamara Fetters

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It is estimated that five million women are hospitalized annually for induced abortion–related complications in the developing world (Singh 2007). More detailed information on this long- and short-term morbidity is greatly needed. Addressing the topic has been a research challenge for many decades because of the difficulty in distinguishing between morbidity from miscarriages and from "unsafely or illegally" induced abortions. In response to this challenge, a task force of the World Health Organization (WHO) proposed and tested a methodology in the 1980s to measure the levels and health consequences of unsafe induced abortion in settings where the procedure is highly legally restricted (Figa-Talamanca et al. 1986). The WHO methodology was tested in a four-country study to provide policymakers around the globe with evidence on the extent of illegally induced abortion. Researchers in Malaysia, Nigeria and Turkey collected prospective data on all postabortion patients admitted to hospitals during the study period; in Venezuela, a systematic sample of postabortion cases was drawn and analyzed retrospectively.

Postabortion cases were classified as either induced or spontaneous based on information recorded by the provider using a standard set of medical criteria developed by the Task Force. Clinical records of the woman's diagnosis, treatment and outcome were then combined with data collected during a discharge interview on her social, demographic and reproductive characteristics. The classification of the woman's abortion as induced (certainly, probably, possibly) or spontaneous was based on the woman's own statement about her attempt to interrupt the pregnancy; a health worker or relative's statement that the woman died as a result of the abortion; evidence of genital trauma or a foreign body in the uterus, vagina or cervix; presence of sepsis or peritonitis; and the pregnancy having been unplanned, as indicated by the woman's reported recent use of contraception.

The WHO methodology has continued to evolve in the three decades since the mid-1980s study described here. The methodology now described here as the Prospective Morbidity Methodology (PMM) has since been used to classify cases using retrospective hospital records (detailed elsewhere in a description of the Abortion Incidence Complications Method, or AICM, Chapter 6) and prospective data collected from each postabortion patient over a designated period. Examples of the prospective approach include studies conducted in South Africa in 1994 and 2000 (Rees et al. 1997; Jewkes et al. 2002); in Kenya in 2002 (Gebreselassie et al. 2005); in Cambodia in 2005 (Fetters et al. 2008); and in Ethiopia in 2008 (Gebreselassie et al. 2010). A further adaptation of the approach was used in Nepal and is also discussed in the box later in this chapter (Henderson et al. 2007).

The purpose of this chapter is to:

1) Describe the differences in the use of the methodology in the four countries—Cambodia, Ethiopia, Kenya and South Africa—with prospective data collection experience.
2) Critically review the results of the methodology in these varied sociopolitical contexts with a range of legal restrictions on abortion. Explore the factors that may have influenced the predictive value and outcomes of the studies, including study-design differences, types of data collection methods, validation approaches used, supervision issues, and use of self-reported data on a range of topics, including family planning.
3) Make recommendations for the improvement and future use of the PMM.

This chapter draws lessons from and describes the challenges identified by researchers in the prospective studies just mentioned. A discussion of each study's design, strengths, limitations, findings, policy implications and recommendations is provided.

Evolution of the PMM: A Brief History

The PMM has evolved from the mid-1980s when it was used to distinguish between miscarriages and induced abortions to focus instead on the clinical symptoms of morbidity severity from all pregnancy losses. Indeed, when South African researchers published a validation of their findings from that 1994 study, they suggested that the methodology resulted in an underestimation

of unsafely induced abortions and confirmed the challenges experienced by earlier researchers in making these designations (Figa-Talamanca et al. 1986; Huntington et al. 1998). They suggested removing women's contraceptive status and suggested that it may not be necessary to distinguish between unsafely induced abortion and miscarriages. However, Jewkes and coauthors remained convinced of the utility of the methodology and suggested that the political and economic implications of morbidity data—even if they include a certain unspecified amount of miscarriages—are as compelling as the actual incidence of induced abortion. They made a series of recommendations for improving the technique (Jewkes et al. 1997), primary among them that the clinical symptom classification be refined and used to determine the severity of morbidity rather than predict the likelihood that an abortion was induced.

As a result, symptoms put forth as criteria by the South African group are now used to classify postabortion complications into high, moderate and low severity rather than the previous outcomes of miscarriage or possibly, probably or certainly induced abortion (Jewkes et al. 1997). The South African group further proposed that their findings be used to improve public policy on legal abortion and refine clinical care. In South Africa, for example, studies using the methodology were conducted before and after liberalization of the abortion law in 1996 to document any changes in morbidity. Since the 1997 validation study of the 1994 data, the methodology has been used primarily to document the symptoms and severity of complications to provide detailed information on the extent of pregnancy-loss morbidity and its severity in facilities in South Africa, Kenya, Cambodia, Nepal and Ethiopia. The methodology has received scrutiny by critics who feel it inadequately distinguishes induced from spontaneous abortions and thus question its utility in estimating morbidity caused by induced abortion (Rossier 2003).

The legality of induced abortion varied in each country where the PMM was implemented. Kenya's abortion law is the most restrictive, allowing abortion only to save the life of the woman. In South Africa in 1994, abortion was restricted but the indications for legal abortion were expanded with passage of the 1996 Choice on Termination of Pregnancy or CTOP Act. Cambodia revised its law in 1997. Thus South Africa and Cambodia are the least restrictive of the four, since they both allow abortion on request through the first trimester and, in certain circumstances, in the second trimester. For a variety of reasons, many women in countries where restrictions on induced abortion have been eased continue to use traditional or unsafe methods to induce abortion and thus present at facilities with postabortion complications.

Each of the studies used the signs and symptoms of abortion complications as recorded by providers of postabortion care to assess abortion morbidity and mortality. Weekly measures of postabortion admissions and their classification as induced or spontaneous were weighted and used to produce annual estimates of women treated in facilities for miscarriages and illegally induced abortions. Complications on a national scale are categorized into low, moderate and high severity (Table 1, see tables at the end of the chapter).

A woman who has an unsafe abortion, a miscarriage or even a safely performed abortion (in rare instances) may suffer from complications. Some women will not seek care no matter how serious the symptom; others may seek care for mild symptoms or to ensure that the abortion is complete. Today, morbidity severity is defined as:

- **Low:** no adverse or suspicious symptoms other than bleeding.
- **Moderate:** signs of mild infection such as a slightly elevated temperature, localized peritonitis identified by a tender uterus or "offensive" products of conception.
- **High:** shock, physical evidence of interference with the pregnancy, organ failure, highly elevated temperature, elevated pulse rates, generalized peritonitis or death.

Data Collection

Postabortion care providers are the data collectors for this methodology. They are trained in the methodology and data collection techniques and are responsible for recording information in a standardized data-capture form over a predetermined period of consecutive days. Each of the participating facilities requires 1–3 health care providers (depending on caseloads) to attend training sessions on data abstraction. For all women who are treated for postabortion complications at the facility over a 2–4 week period, the trained providers are expected to record the women's diagnosis, treatment, and social and demographic information in addition to carrying out their usual responsibilities in the health facility.

Information on all abortive outcomes of pregnancies of less than 22 weeks' gestation—both spontaneous and induced—are collected at the sites; these spontaneous and induced abortions include diagnoses of incomplete, missed, inevitable, complete and septic abortions. Data-capture forms have varied but most often contain questions associated with standard patient demographic, reproductive and contraceptive history; the symptoms that led her to the facility; and their clinical management. The flow of the data-capture form approximates the continuum

of care offered to women. The data are weighted (to account for sample design and the duration of the data collection period) and yield national estimates of admissions for postabortion (spontaneous and induced) complications for the sectors where data have been collected.

Sampling and Sample Considerations

The studies conducted in South Africa (the 1994 study and its validation, and the 2000 study), Kenya (in 2002), Cambodia (in 2005) and Ethiopia (in 2008) used different sampling strategies, including simple random sampling, probability proportionate to size and multistage cluster sampling, as identified in Table 2. Samples were drawn from the public sector only, with the exception of the Ethiopian sample, which also included private facilities. The Cambodian and Ethiopian studies included hospitals and health centers; all other studies were limited to hospitals only. The only validity study conducted to date, the study in South Africa, used medical records to verify and review prospective records collected by providers in the 1994 study. Three studies (the ones done in Cambodia, Kenya and in South Africa in 2000) used a 21-day data collection period; the 1994 South Africa study used a 14-day data collection period, and the Ethiopia study was based on a 28-day period. Although this chapter discusses morbidity from incomplete miscarriages and unsafe induced abortions, the study design in Cambodia and Ethiopia allowed for data to be collected on legal abortions performed in the sampled facilities. It also counted instances where women requested an elective abortion and had to be referred elsewhere because the facility either lacked the necessary expertise to perform an abortion or the administrative approval to do so.

The PMM requires a significant investment in time and resources, as well as the support of the facilities and data collectors to ensure forms are completed for all possible abortion patients. In large hospitals, postabortion admissions can occur in as many as three wards, 24 hours per day, adding further complexity for busy data collectors. Estimates of abortion outcomes are limited to sectors and facility types included in the study design, and each sector or facility type adds another layer of difficulty to the data collection process in terms of identifying or listing all facilities, establishing inclusion criteria for postabortion care provision and selecting the appropriate sampling fraction.

As such, it is necessary to know enough about the context and environment of postabortion care to make satisfactory study-design decisions. For instance, a substantial portion of postabortion care is provided in the private sector, yet recordkeeping of such care is especially likely to be incomplete, which makes listing the universe of private facilities providing postabortion care in a country a major endeavor.

In many countries, postabortion care services are highly subsidized and findings from PMM studies conducted to date confirm that women with the most severe morbidity—who are especially likely to be poor—likely seek free or low-cost care in public-sector hospitals as opposed to private health facilities. The severity of complications further affects the type of health facility women come to: Substantial program efforts have been launched in health centers and a large proportion of women with mild symptoms seek care there, reflecting the contribution of less severe morbidity to national estimates of morbidity treated in all types of facilities.

Ethical Issues

In the cases of Cambodia, Kenya and Ethiopia, no informed consent was requested of women seeking postabortion care. Although each woman had a data collection form, no medical records were accessed and no names were included on data extraction sheets, so women could not be identified in any way. Data extraction sheets were meant to capture absolute counts of key clinical pieces of information. Yet, with each subsequent application of the method, researchers have become interested in obtaining more detailed information from patients beyond the simple synopsis of clinical management. Examples of this type of information are a more thorough reproductive history, including contraceptive use at the time of pregnancy; social and demographic information, particularly on education and poverty; and a question assessing whether the woman had done something to interrupt her pregnancy. This last question was not asked in Kenya to avoid exposing women to the risk of prosecution for breaking the law, but was asked in Cambodia and Ethiopia where the abortion laws are less restrictive; although the 2000 South African study could have asked women this direct question, none of the study publications indicate that it did so.

Data Quality Concerns

The prospective nature of the data is a strong advantage of this methodology, since a prospective design avoids relying on estimates from interviews or incomplete medical records. Also, having providers themselves be data collectors is an asset in this highly specialized area of clinical care, especially given the ongoing dissent over appropriate terminology for diagnoses and classifications of abortive outcomes. These strengths can be further improved with good training on data collection techniques, strong supervision and continuous follow-up during the data collection period.

The most common critique of the methodology is the possibility that data collectors are unable to complete the

data extraction forms for every case, particularly during weekends, evenings or heavy caseload times—when large numbers of women present in several wards at once and hospitals tend to be understaffed. Since data are most often weighted, each omission is amplified by its absence and the longer data collection periods of three to four weeks could further increase this underreporting. A number of safeguards have been used or suggested to minimize this weakness. In some cases, providers have trained others at their facilities to assist them. Where accurate records are kept, data extraction sheets are checked against hospital logs or admitting registers and simple tallies have been proposed to allow for adjustment during the analysis phase. Most recently in the Ethiopia study, PMM results were compared with provider estimates from another survey (Health Facilities Survey, described in Chapter 6 and a mean of the two types of data was taken and used to estimate national incidence of treated complications.

Morbidity Results in the Four Country Studies

Table 3 presents the results of the four PMM studies along with some key demographic background information. The pattern of morbidity from abortions and miscarriages was distinctly different in Cambodia compared with that in the other three countries: Morbidity in Cambodia tilted toward the moderate and severe, whereas the majority of cases in the other countries were low morbidity. For example, 42% of postabortion cases qualified as high morbidity in Cambodia, compared with just 28% and 10% in Kenya and South Africa, respectively.

In Cambodia, one of two countries for which data from both hospitals and health centers are available, health centers treated a higher proportion of women with high-severity complications than hospitals did (not shown). In fact within Cambodian health centers, a higher proportion of women presented with high-severity complications than with low- or moderate-severity complications. Overall, Cambodian providers in public health centers cared for slightly more than 80% of all postabortion cases treated; even though health centers averaged a small number of cases per facility (range: 0–14; mean: 1–2 cases for small and large health centers), the large proportion of Cambodian cases seen in health centers seems to indicate that they are the first source of care for women in this country. By comparison, in the only other country with health center data, Ethiopia, only 53% of all cases were treated in public health centers.

The annual incidence of postabortion complications treated in public-sector facilities was similar in South Africa and Kenya (362 cases per 100,000 women and 303, respectively). It was 349 per 100,000 in Ethiopia but more than twice that value in Cambodia—867 cases per 100,000 women of reproductive age. The country patterns in ratios of treated postabortion complications per 1,000 live births were similar to the patterns in rates, with the ratio being highest in Cambodia—93 per 1,000 live births versus 44 in South Africa and 19–20 each in Ethiopia and Kenya, respectively. Again, the comparability of these data is limited by the different sampling strategies and types of facilities included in the four countries. Noting the high utilization of health centers for postabotion treatment in Cambodia, it is possible that annual incidence is lower in Kenya and South Africa because health centers were not included in those two African countries; Cambodia's annual measures are similar to Ethiopia's, where all types of facilities were included. The exclusion of the private sector may also have an impact in countries where a significant proportion of postabortion care is provided in that sector. When coverage of other types of facilities is included, such as primary level and private facilities, a more comprehensive picture of the national situation is achieved.

Self-Reported Induced Abortions

In the 1994 South Africa study and in Ethiopia and in Cambodia, women's self-reports of having attempted to interrupt the pregnancy were used in addition to the provider's assessment of the woman's symptoms and diagnosis. The incorporation of women's own reports was deemed unethical in Kenya for fear of identifying women and putting them at risk of arrest for attempting an abortion. As mentioned earlier, although the 2000 South African study could have asked women this direct question, none of the study publications indicate that it did so.

In the 1994 South African study, before the liberalization of the abortion law in 1996, postabortion patients were directly asked if they had had an induced abortion. Only a small proportion, 3.4%, indicated to providers that they had, compared with clinicians' opinions that 15% had "certainly" and 41% had "probably" had an induced abortion, according to the original WHO algorithm using only clinical symptoms and contraceptive behavior. The researchers who conducted the 1994 study concluded that most women who had had an induced abortion had been unwilling to acknowledge it and that one-third of the cases that providers felt were "certainly induced" would have been missed had they relied on women's own reports.

In the applications of the method in Cambodia and Ethiopia, countries where legal restrictions on abortion had recently been lifted, 37% of all women who presented with complications reported that they had attempted to interrupt the pregnancy, compared with only 14% in Ethiopia; both proportions likely under represent

the true proportion. Research on abortion stigma has repeatedly shown that women underreport their induced abortions (Rossier 2003), although some studies indicate that women are more likely to report abortion attempts to their health providers than to survey interviewers (Fetters 2008). The higher rate of disclosure in Cambodia than in Ethiopia could be a result of comparatively less societal stigma regarding abortion in Cambodia. The legal status of the woman's behavior was not in question; there is no evidence or record of prosecution for performing or obtaining an abortion in Cambodia during the past decade. It is also possible that the provider's gender and professional training could have made a difference in the rate of disclosure in Cambodia. In all settings, however, the wording and administration of the question on whether a woman had attempted to interrupt her pregnancy should take into account the relative weight of abortion stigma in a society, the status of the law, the conditions of care-seeking behavior and local methods of inducing abortion.

Strengths of the Method

Flexibility of the Instrument: Incorporating Items on Elective Procedures

After the law changed in Ethiopia and Cambodia, the instrument allowed for additional questions on the provision of both legal induced abortions and referrals to other health facilities for care if the provider was unable to treat the woman. In total, providers reported performing 6,976 legal terminations in Ethiopia and 178 in Cambodia. Although we lack comparable data for Ethiopia, for Cambodia, we know that only 59% of all women who requested a legal termination actually received one. The proportion of women who requested an elective termination but were sent away to likely obtain a procedure elsewhere—41%—makes a strong statement about the inadequacy of current care: This high referral rate shows that many health centers and some hospitals lacked the technical expertise or government authority to perform abortions. Referrals for abortions are especially troublesome because women who are turned away may choose an unsafe abortion out of desperation or delay obtaining a safe abortion until the second trimester, which increases the procedure's risks, complexity and cost.

This important information on the proportion of women who were unable to receive a legal abortion when they requested one has valuable policy implications. It shows the extent to which women's abortion needs are not being met and illustrates how government providers might be complicit in perpetuating the problem of unsafe abortion. However, we caution that the numbers of referrals for care elsewhere may be duplicate entries; each woman referred could enter the sample again at another facility. This situation requires sensitivity analyses to produce upper and lower estimates because it is not possible to know from the present methodology the proportion of abortion seekers who went on to obtain an abortion in or outside a health facility after their initial denial.

High Policy Relevance of Morbidity Data

In their 1997 paper, "Methodological issues in the South African incomplete abortion study," Rachel Jewkes and coauthors defended the morbidity severity classification as a useful tool to describe and monitor postabortion complications in the national health system. In prior studies, they described the clinical management of abortion cases and treatment costs by complication severity (Kay et al. 1994; Rees et al. 1997). In a subsequent study, they assessed the impact of legislative change on national abortion morbidity patterns (Jewkes et al. 2002).

The PMM facilitates policy-relevant findings because it calls for extensive involvement of Ministries of Health in the preparation, implementation and dissemination of the findings. This positive ministry involvement occurred in all four countries where the method has been applied on a national level. Each study had clear objectives—to improve public policy or improve clinical care. In South Africa, the methodology was used twice in a six-year period and was thus able to document positive changes in abortion-related morbidity after liberalization of the abortion law. In Kenya, researchers hoping to bring about reform in the country's highly restrictive law were able to document the considerable personal and financial cost of widespread abortion morbidity and mortality. In Cambodia, the objectives were somewhat different; having watched the implementation of the 1997 abortion law stall, Ministry of Health officials felt it was important to bring new attention to the issue in order to convince public officials, health care providers and the general public that the topic required higher priority on the national agenda.

National policymakers interested in promoting better access to higher quality abortion services need more information on the cost of treating complications from abortions, particularly those that result from unsafe abortion. To the extent that PMM data primarily reflect morbidity from induced abortions, they are useful for national policy considerations, since they illustrate the demand for abortion-related care and the resources wasted in treating complications that could have been saved with access to safe abortion services. Although the PMM has been used only once to develop national cost estimates, in South Africa, more refined cost estimates with the methodology are certainly possible. The detailed information on clinical management and treatment allow for a more precise model of resource allocation and care at each type of facility.

These calculations require additional data to be collected to calculate a cost-per-case estimate, which has thus far been done in South Africa only (Kay et al. 1997). Work is also underway to develop these estimates in Ethiopia.

Flexible, Easily Adaptable Design

In the most recent application of the method, in Ethiopia, investigators initiated a collaborative effort to expand the study design to apply the AICM (described in Chapter 6) along with the PMM. Incorporating the AICM, which uses the numbers of women receiving treatment for complications to calculate the proportion of those who develop complications but do not require medical treatment or who need treatment but do not obtain it, provides unique opportunities to triangulate methods to estimate the incidence of postabortion cases, as well as the incidence of induced abortion on a national scale.

Limitations

Subnational Coverage of Facilities

To date, the method has focused primarily on the public sector, with private-sector data being collected in just a single country (Ethiopia). As a result, the PMM gives lower priority to coverage in private health facilities and those run by nongovernmental organizations. However, doing so would produce more comprehensive national estimates. Yet sampling private facilities is likely to be problematic, as some practitioners have warned that compliance and validity would be difficult to achieve without a government mandate to participate, such as a directive from the ministry of health.

Omission of Cases Not Treated in Formal Facilities

The design accounts only for those postabortion complications that reach formal facilities. The methodology does not provide data on postabortion complications that are treated outside the formal medical system, which is a major limitation in countries that have highly restrictive laws. For example, in Guatemala, Mexico, Pakistan, Peru and Uganda, an estimated 15% of women who have an unsafe abortion develop complications but do not receive facility-based treatment for them (Singh et al. 2009).

Inability to Calculate Incidence Based on Morbidity

Collecting information on patients treated for postabortion complications has also been used to estimate overall national levels of induced abortion, once complications from miscarriages are removed from the data (Singh and Wulf 1994; Singh et al. 1997; Henshaw et al. 1998; Singh et al. 2005; Juarez et al. 2005; Singh et al. 2006). Two pieces of data are required to complete this calculation:

1) the annual number of women who seek care for complications of induced abortions in facilities (often estimated from the responses of key informants in a Health Facilities Survey); and
2) the proportion of all women who have an induced abortion who will either not develop serious complications or who do but do not seek care at a formal medical facility (estimated from responses to a survey of health professionals who are knowledgeable about the safety conditions of abortion in their country).

While the use of the PMM provides detailed evidence for the first piece of information, researchers need to either use a Health Professionals Survey (HPS) or put forward more innovative ways to estimate the second piece of information. Responses to the HPS generate the multiplier, or the proportion of women having induced abortions who do not develop complications, or who do but do not seek care at all or who seek care outside of facilities. This inflation factor needs to be applied to the morbidity data to generate the total incidence of induced abortion in a given country. While specific policy objectives may motivate study inception, increasing international comparability and evidence on national abortion incidence requires gathering further information such as the proportion of women who do not seek medical care after an unsafe abortion and the proportion of complications due to miscarriage, to allow estimation of induced abortion on a national level.

Unstandardized Terminology for Abortion Symptoms

The type of data abstraction that the method relies on is impossible to perform retrospectively. While international standards of recordkeeping are improving in each of these countries, much of the improvement in Kenya, Ethiopia and Cambodia has been limited to tertiary-care centers. The use of diagnostic codes for treatment of complications from induced abortion is still uncommon in many facilities and health systems around the world. This shortcoming becomes even more crucial if new types of facilities collect data prospectively and data collectors have limited gynecological experience. Such providers, who may be unfamiliar with abortion morbidity, may require longer data collection training. Indeed, even though sampling a greater variety of midlevel providers at both private and primary health facilities will produce a more complete count of postabortion complication cases, doing so will require more substantial efforts to ensure data quality among nonphysician providers in lower-level facilities. Rigorous training and supervision of the data collectors is essential to ensure data quality.

Inconclusiveness of Fever as a Symptom of Morbidity

More consideration needs to be given to the relevance of elevated temperature as an individual morbidity characteristic. Initially, fever or high temperature was indicative of infection which is often, although not always, symptomatic of invasive methods of unsafe abortion. As one of the few objective criteria used in the classification of symptoms, the use of temperature is critical in the morbidity classification system. A very high temperature (at 38 degrees Celsius or higher) alone will classify the severity of a woman's symptoms as high, and fever alone caused much of the difference in the proportion of cases presenting with high morbidity in the Kenyan and Cambodian studies: Among women with documented temperatures, just 6% of Kenyans reached the threshold of 38 degrees Celsius, compared with 36% of Cambodians. (The South African studies did not report temperature as a symptom.) The method's results could be improved with stronger guidelines that standardize when a temperature should be taken (e.g., upon admission or after stabilization) and refinement of the high-severity criteria to include at least two documented high-temperature readings.

Unknown Contribution of Misoprostol

One possibility for the higher proportion with fever in Cambodia is the greater likelihood of the use of prostaglandins, such as misoprostol. Although side effects of misoprostol vary widely with the drug's dosage, gestational age of the pregnancy and route of administration, research has found that fever and chills are common and have been reported in 28–72% of women (Faundes et al. 2007). However, nothing has been documented about the size of the temperature spikes or other side effects of nonrecommended misoprostol regimens. While Cambodian women are known to use pharmaceuticals from neighboring countries along with traditional methods to induce an abortion (Long et al. 1997; Long and Ren 2001; Lester 2003; Hemmings and Rolfe 2008), little is known about the safety and efficacy of those methods. In Cambodia, among the 37% who reported that they had tried to interrupt their pregnancy, 40% had done so with the assistance of a drug seller.

In the long run, better knowledge among women about the availability of less damaging and possibly more effective abortion methods, such as misoprostol and other labor-inducing hormones, will likely decrease the percentage of women requiring care in health facilities. Increases in women's knowledge about and use of pharmacological agents to induce bleeding have been hypothesized to decrease high-severity complications (Singh and Wulf 1994; Jewkes et al. 2002; Jewkes et al. 2005; Grimes et al. 2006).

Researchers in South Africa found that abortion mortality and severe morbidity decreased after the procedure was legalized there in 1996 (Jewkes et al. 2002; Jewkes and Rees 2005). Overall, the number of cases of abortion complications did not change between 1994 and 2000, but the severity of those complications diminished, a likely result of increased community awareness and use of misoprostol (Jewkes et al. 2002; Jewkes et al. 2005). However, as women's knowledge of and access to misoprostol grows, assumptions about the proportion who will need but will not seek care in a health facility becomes an elusive, moving target (Singh and Wulf 1993; Singh and Wulf 1994). It is likely that even in places where abortion is legal, the stigma still attached to it will continue to drive poor women to induce their own unsafe abortions to avoid seeking out providers and paying high fees for legal services.

Other Problems with the Instrument Classifying Morbidity

A good translation of the data form is imperative and medical terminology should be eliminated where possible to improve understanding across languages and cultures. Concerns have been raised about the wording of the diagnoses, use of the terms sepsis and peritonitis, and use of elevated temperature as a proxy for sepsis. In Cambodia, the terms "offensive products of conception" and "foreign body" were not well understood in either English or Khmer, and in Ethiopia, some questioned the diagnosis of "missed and inevitable abortion." These issues remain and have only been superficially addressed; using simpler terminology in the instrument may help avoid confusion before it presents in the field.

The Cambodian findings raise questions about the classification of postabortion morbidity severity. Forty-two percent of postabortion cases qualified as high morbidity in Cambodia, compared with just 10% in South Africa and 27–28% in Kenya and Ethiopia. The variable results of this study design raise many questions about care-seeking behavior that can only be determined by community-based surveys on abortion. However, few surveys of this type have been conduced in Cambodia and none corresponded to the time period of the PMM. The higher prevalence of severe morbidity in Cambodia can stem from the more widespread use of less safe abortion procedures and medications used by paraprofessionals and by women themselves, or by Cambodian women delaying care longer than other women (and thus presenting in poorer condition). In addition, the inclusion of health centers in the Cambodian sample might have driven the increase in high-morbidity cases by capturing more women with severe morbidity from relatively more remote areas.

Problems with the Instrument Measuring Mortality

Abortion mortality estimates have proven difficult to calculate reliably from the PMM due to its short data collection period. In each of these country studies, the instrument is assumed to miss deaths that went undetected as being caused by abortion at the sampled facilities or women who died before reaching a facility for care. Fewer maternal deaths were identified in study facilities in South Africa and Cambodia than in Kenya, a finding perhaps related to less invasive methods being used by South African and Cambodian women and better postabortion services in general or access to them in those two countries. The results were also consistent with a lower annual case fatality rate for abortion complications in government facilities in Cambodia than in Kenya (0.06% vs. 0.87%; case fatality data are unavailable for South Africa). The case fatality rate in Ethiopia of 0.63% is similar to that for Kenya.

Recommendations for Future Use of the PMM

In the future, it is important to include *all* categories of health facilities involved in the provision of postabortion care or to somehow adjust for their omission to estimate postabortion complications on a national level. Including additional sectors or strata in the prospective data collection will produce a more complete national estimate, particularly in groups of facilities whose caseloads vary widely, since one-time caseload estimates made by experts can be less reliable. However, data collection efforts among the generally less compliant and less motivated private-sector providers will take innovation and persistence to minimize the likelihood of underreporting.

The criteria for high morbidity could be improved by increasing the threshold to at least two symptoms from at least one symptom. For example, with the threshold of just one, the sole presence of elevated pulse, elevated temperature or generalized peritonitis may not be enough on its own to objectively and positively determine high morbidity. On the other hand, the single criterion of elevated temperature alone could overestimate high morbidity in an environment with endemic malaria or high levels of suspected use of misoprostol to induce abortion. With the exclusion of death, each of the high-morbidity symptoms (e.g., shock, evidence of a foreign body, high temperature, high pulse, generalized peritonitis or organ failure) is often and should be present to confirm the severity of the case. As techniques of inducing abortion become less invasive around the globe, symptoms associated with unsafe induced abortion should become less severe: The increased use of manual vacuum aspiration, decreased use of sharp curettage and more widespread knowledge and resulting use of medication abortion are all likely to continue to decrease abortion morbidity worldwide.

Further use of the PMM methodology requires accompanying validation studies to explore possible underreporting and solutions to address it. Validation of this methodology using multiple methods is important to refine estimates and projections as well as improve the methodology itself. The South Africa validation study examined six facilities and systematically scrutinized the findings. That work has proven to be valuable in shaping subsequent applications of the methodology. Further exploration of the validity of PMM findings is necessary to improve the rigor of the method.

The use of sensitivity analyses to assess the classification of morbidity severity based on treatments rather than symptoms, as was done in Nepal (see box), should be tested further. This innovation could decrease costs, produce reliable estimates for resource use, extend possibilities for longitudinal data collection in facilities with good records and improve the cultural appropriateness of the methodology.

Conclusion

The measurement of postabortion complications is necessary to inform policy efforts to address the problem of unsafe abortion and the national resources that are invested in postabortion care. Measurement of the extent of induced abortion is also important to evaluate family planning efforts, understand fertility dynamics and contraceptive failure rates, and disaggregate the proximate determinants of fertility. To the extent that the data provided through the PMM primarily reflect morbidity from induced abortion rather than from miscarriages, the method can be adapted to contribute to validating methods of estimating incidence and provide an overall better understanding of the magnitude and burden of unsafe induced abortion.

Retrospective Data on Postabortion Treatment in Kathmandu, Nepal

Researchers conducted a retrospective, medical-chart review of women admitted to the largest obstetric care hospital in Nepal for complications from abortion from April 2000 through December 2007. Nearly 20,000 obstetric and 3,600 gynecological cases are admitted annually, with more than 40 deliveries each day, on average. In March 2004, two years after the law changed to allow elective terminations, the hospital's services expanded to include a comprehensive abortion care facility. Review and abstraction of charts was initiated in March 2007 and is ongoing.

All patient charts for women treated for gynecological problems were screened for eligibility. These included charts for women presenting to all parts of the hospital, including the emergency department, postabortion care unit and gynecology and obstetric departments; maternal and neonatal deaths were also recorded. To determine eligibility, diagnostic fields were reviewed and all spontaneous and induced abortion cases (threatened, inevitable, incomplete, complete and septic) were abstracted. When the diagnostic field did not specify abortion but included a diagnosis or treatment suggestive of pregnancy loss, other fields such as *history* and *operation record* were also reviewed. In addition, cases with surgical treatments highly suggestive of abortion, such as repair of uterine perforation, were abstracted even when the term "abortion" was not used. Finally, in cases of questionable eligibility, a senior Obstetrician/Gynecologist or senior nurse involved in postabortion care at the hospital reviewed the chart to make a final determination. All charts screened for eligibility were entered into a study registry, and all eligible cases were abstracted using a standardized form.

In addition to using the symptom severity index of Jewkes et al., the investigators, together with clinicians with experience in treating abortion complications in developing-country settings, developed a second measure of severity. This second measure replicated the low-, moderate- and high-morbidity categorization with *treatments* rather than with *clinical symptoms*. For example, cases coded as low-severity were those treated conservatively with manual vacuum aspiration (MVA), repeat MVA, referral to an abortion provider (post 2004), dilation and curettage (D&C)/dilation and evacuation (D&E), or repeat D&C/D&E. Moderate-severity cases were those receiving intravenous fluids, tetanus toxoid inoculation and/or antibiotics administered orally (or rarely, intramuscularly). (For example, difficulties assessing the seriousness of infection posed by the Jewkes criteria were addressed by distinguishing between orally and intravenously administered antibiotics.) High-morbidity cases were those that underwent surgery; received intravenous antibiotics and/or a blood transfusion; and/or spent time in the maternal intensive care unit. In this study, cases of complications were identified as complications from an induced abortion if an induced abortion was documented in the chart. (Some induced abortions were noted in the chart as having been self-reported, others were noted by the physician and may have been based on clinical opinion rather than direct evidence, as when a foreign object or injury from instrumentation was documented.)

Agreement between the two severity measures was moderate (Kendall's $T_b = 0.26$); 318 cases were categorized as high morbidity by both measures. A high proportion of the high-morbidity cases in the treatment index were classified as low morbidity in the symptom index, but a small proportion of the cases coded as high morbidity in the treatment index were coded as low morbidity in the symptom index.

Measurement error and misclassification bias are known to be substantial in abortion research. The quality of data abstracted from medical charts is directly affected by the completeness of clinical recordkeeping, the organizational systems for chart storage, the physical characteristics of the chart-storage system, and the resources and skills of the research staff involved in chart abstraction. However, the influence of missing data on the classification of patients is unlikely to be random and missing chart data likely indicates a lower morbidity classification.

The treatment-based measure is recommended for retrospectively capturing data and classifying morbidity based on information that is routinely recorded in medical records and thus can be used where good recordkeeping exists. The collection of treatment data is more sensitive to variations in medical practice and institutional protocols, and holds potential for future replication. However, it is likely less useful in facilities, such as health centers, where recordkeeping is incomplete or nonexistent.

Adapted from Henderson J et al. 2007

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TABLE 1. Clinical typology for classification of abortion complication severity

Level of severity	Criterion
Low (requires all criteria)	Temp. < 37.3 degrees Celsius
	No clinical signs of infection
	No system or organ failure
	No suspicious findings on evacuation
Moderate (requires ≥1 criterion)	Temp. 37.3–37.9 degrees Celsius
	Localized peritonitis (tender uterus, discharge)
	Offensive products of conception
High (requires ≥1 criterion)	Death
	Shock
	Evidence of foreign body or mechanical injury*
	Organ or system failure
	Temp ≥38 degrees Celsius
	Pulse > 119 beats/minute
	Generalized peritonitis

*Does not include physical evidence of misoprostol tablets. *Source:* Adopted from Rees et al. 1997.

TABLE 2. For five applications of the PMM, elements of the study design, data collection process and legal status of abortion

Element	South Africa 1994	South Africa 2000	Kenya 2002	Cambodia 2005	Ethiopia 2008
Legal status of abortion	Severely limited abortion access for most South Africans	On request through 12 weeks. Some restrictions after 12 weeks	Legal only to save the life of the woman	On request through 12 weeks. Some restrictions after 12 weeks	Allowed In cases of rape, incest, physical or mental disabilities, to preserve a woman's life or health, or if a woman is physically or mentally unprepared for childbirth
Sampling strategy	Simple random sampling	Probability proportionate to size	Multistage cluster sampling	Probability proportionate to size	Stratified random sampling
No. of public hospitals	56	47	143	71	90
No. of public health centers	0	0	0	115	158
No. of private facilities	0	0	0	0	96
Duration of data collection (days)	14	21	21	21	28
% of postabortion patients who self-reported an induced abortion attempt	3	u	u	37	14

Note: u = unavailable.

TABLE 3. Selected contextual variables and results of recent PMM studies conducted in South Africa, Kenya, Cambodia and Ethiopia

Variable	South Africa 2000	Kenya 2002	Cambodia 2005	Ethiopia 2008
No. of women of reproductive age*	13,478,000	6,895,000	3,644,327	16,582,708
Total no. of births	1,106,000	1,088,102	340,470	2,964,323
Maternal mortality ratio (MMR) (maternal deaths per 100,000 live births)	340	414	472	673
Percentage distribution of postabortion (spontaneous and induced) admissions by severity of morbidity	(N=761)	(N=809)	(N=629)	(N=1,932)
Low	72%	56%	28%	59%
Moderate	18%	16%	30%	14%
High	10%	28%	42%	27%
Total	**100%**	**100%**	**100%**	**100%**
Sector	**Public**	**Public**	**Public**	**Public and private**
Projected no. of annual admissions for treatment of postabortion (spontaneous and induced) complications	49,653	20,893	31,579	57,964
Annual incidence of postabortion (spontaneous and induced) complications (per 100,000 women)	362	303	867	349
Ratio of admitted postabortion complications (per 1,000 live births)	44	19	93	19.6
No. of maternal deaths in sampled facilities during study period	1	7	1	7
Case fatality rate	u	0.87%	0.06%	0.63%(hospitals only)

*Ages 15–49 for all countries except South Africa, where reproductive age is defined as 12–49. *Note:* u = unavailable. *Sources:* **South Africa**—Jewkes et al. 1997 and 2002. **Kenya**—for population numbers: Gebreselassie et al. 2005 for MMR: Central Bureau of Statistics (CBS) [Kenya], Ministry of Health (MOH) [Kenya] and ORC Macro, *Kenya Demographic and Health Survey 2003*, Calverton, MD, USA: CBS, MOH and ORC Macro, 2004. **Cambodia**—for population numbers: see Fetters et al. 2008; for MMR: National Institute of Public Health, National Institute of Statistics [Cambodia] and ORC Macro. *Cambodia Demographic and Health Survey 2005,* Phnom Penh, Cambodia and Calverton, MD, USA: National Institute of Public Health, National Institute of Statistics and ORC Macro, 2006. **Ethiopia**—for population numbers: Federal Democratic Republic of Ethiopia Population Census Commission, *Summary and Statistical Report of the 2007 Population and Housing Census—Population Size by Age and Sex,* Addis Ababa, Ethiopia: Population Census Commission, 2008; for MMR: Central Statistical Agency (Ethiopia) and ORC Macro, *Ethiopia Demographic and Health Survey,* 2005, Addis Ababa, Ethiopia: Central Statistical Agency; and Calverton, MD, USA: ORC Macro, 2006.

CHAPTER 11

Use of Health System Data to Study Morbidity Related to Pregnancy Loss

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Millions of women each year suffer from unsafe abortion and its complications worldwide. Measuring the level of abortion in countries where it is highly legally restricted is difficult, since procedures are generally carried out outside the formal health system and are not reflected in health records. Official health information systems in some countries, however, do provide regular data on deaths and hospitalizations due to abortions. Depending on the quality and completeness of coverage of these health information systems, they can be a very valuable source of data to analyze abortion-related mortality and morbidity.

Over the past 15 years, the World Health Organization (WHO), with inputs from other international organizations, has focused attention on estimating abortion ratios and rates and maternal mortality caused by unsafe abortion at global, regional and subregional levels. The most recent round of estimates are for 2003 (WHO 2007a). However, fewer efforts have attempted to study abortion-related morbidity, especially at the individual-country level. Most such studies are small scale and have been limited to measuring the number of women who are hospitalized for abortion-related complications.

A few, however, are large-scale national studies that use a variety of data sources. For example, an important source of aggregate data is hospital discharge data from national health information systems that detail diagnoses or causes for admission, including abortion-related morbidity. Documentation for the provision of health care services, including hospital-based care, usually includes use of the International Classification of Diseases (ICD), which categorizes reasons for admission and thus provides an indication of the type of care provided to patients (WHO 2007b). This classification system originated in France during the middle of the 19th century and has been used by the WHO since the organization's inception.

The ICD represents a global effort to systematize the documentation used in health care services worldwide. It uses standardized definitions of diseases that allow for comparisons of causes of mortality and morbidity across contexts, times and places. Version 10 of the ICD has been used since the late 1990s to the present. Using aggregate health data based on the ICD classification system, one can calculate the total number of hospitalizations related to abortion for a specific time period; additionally, if population data (number of women) are available for the same period, the numbers of hospitalizations can be converted into rates. Depending on the extent of data collection beyond ICD-10 codes, hospitalization rates can be estimated by health-system sector, patient age-group, year of hospitalization, type of procedure and gestational age. Where comparable data are available for several years, trends can be assessed. Moreover, such trends can serve as the basis for projecting future numbers by taking into account projected population growth and assuming that factors that affect hospitalization rates for abortion-related morbidity—such as contraceptive coverage, the legality of abortion, the procedure's safety and resulting severity of morbidity and access to services—remain unchanged. In turn, these projections may be used to estimate budgetary expenses for the public health care sector.

Another source of aggregate national data on abortion-related morbidity in countries where the procedure is highly legally restricted and that have inadequate national health system data is nationally representative sample surveys of facilities that provide postabortion care. The design of these surveys includes interviewing a key informant at each sampled facility to estimate the average number of patients treated annually. Since the symptoms of morbidity from miscarriages and induced abortions are similar and women are understandably reluctant to admit to having had an induced abortion and providers are often reluctant to expose patients to legal repercussions, such surveys are specifically designed to estimate the number of women who are treated for both spontaneous and induced abortions. Using a methodology developed in the early 1990s (Singh and Wulf 1994), spontaneous abortions are removed from the total (based on assumptions of the

biological constant of late miscarriages and the proportion of women who are likely to obtain hospital care for deliveries); the remaining hospitalized induced abortions then provide the basis for indirect estimates of the national incidence of *all* induced abortions, including the ones that do not require treatment.

This approach was first used in the mid-1990s in Nigeria and Bangladesh (Singh et al. 1997; Henshaw et al. 1998) and later in Uganda and Guatemala (Singh et al. 2005; Singh et al. 2007). Recently, a meta-analysis that relied on hospitalization data from both sample surveys of facilities and official health systems from 13 developing countries estimated an average annual rate of 5.7 hospitalizations for morbidity resulting from induced abortion per 1,000 women in all developing-country regions (Singh 2006).

Finally, some studies have obtained individual-level data on abortion-related morbidity using various approaches, including extracting data from medical records; interviewing postabortion patients; and combining record-based data and patient interviews. Data on individual patients can be obtained retrospectively (by using medical records from earlier years) or prospectively (by collecting data on all relevant patients admitted during a short period of time, such as a few weeks or a few months; see Chapter 10). Some of these studies are nationally representative and collect prospective data on all postabortion patients treated at a national sample of facilities that provide postabortion care. This design has been applied in South Africa (Rees et al. 1997; Jewkes et al. 2002), Kenya (Gebreselassie et al. 2005) and Cambodia (Fetters et al. 2008). An advantage of this design is that it can obtain individual-level data on the severity of abortion-related morbidity, as well as data on specific treatment and its cost.

Induced Abortion in Latin America

The region of Latin America and the Caribbean has one of the highest estimated levels of unsafe abortion in the world (WHO 2007a) despite also having laws that severely restrict the procedure (Sedgh et al. 2007; Katzive and Boland 2008). An estimated 3.9 million unsafe abortions take place each year in the region; unsafe abortion accounts for 11% of all maternal deaths in the region and for an unknown level of illness and disability, both acute and long-term (WHO 2007a).

In the specific case of Mexico, unsafe abortion remains an important source of maternal mortality: From 1990 to 2005, 7.2% (n=1,537) of all registered maternal deaths were associated with pregnancy losses. Even if these deaths cannot be ascribed to specific ICD-10 subcategories, most were likely related to severe complications from unsafely induced procedures. Despite a gradual decline in maternal mortality overall during this period, abortion-related mortality did not change in terms of the absolute numbers of women dying or the specific contribution of abortion to maternal deaths (Schiavon et al. 2007). Mexico's abortion laws vary among the country's 31 states and are generally highly restrictive. The exception is the Federal District (Mexico City), whose abortion law was reformed in 2007, making services legal on request there in the first trimester of pregnancy.

One recent study using Mexican health system data at two points in time (1990 and 2006) found that the rate of hospitalization from morbidity caused by unsafe abortion hardly changed over the 16-year period, increasing only slightly from an annual rate of 5.4 to 5.7 per 1,000 women (Juarez et al. 2008). However, the overall safety of abortion improved over time, probably because women increasingly used safer methods of inducing abortion, such as misoprostol (Lara et al. 2007). According to the indirect estimation methodology mentioned above, one in five women who had an abortion were hospitalized in 1990, but as the procedure became safer over time, the proportion hospitalized declined to one in almost six women in 2006. The estimated rate of induced abortion in Mexico increased between 1990 and 2006, going from 25 procedures per 1,000 women in 1990 to 33 per 1,000 in 2006 (Juarez et al. 2008). This increase was likely caused by desires to avoid pregnancy outpacing the adoption of effective contraceptive use, among other reasons.

Use of Health System Data: An Application in Mexico

This chapter focuses on measures of morbidity related to pregnancy loss from health system data, using Mexico as a case study. Since induced abortion is severely restricted by law and highly stigmatized in many countries, including Mexico, accurately classifying and registering the cause of hospitalization as "induced abortion" may be risky for the woman and the health professional. The standard IDC-10 system for coding diagnoses covers morbidity from all types of pregnancy losses, including induced abortions. However, induced abortions are generally incorrectly classified under codes that are less specific and less stigmatized, for the reasons indicated above. Therefore, we decided to not differentiate between specific types of pregnancy loss and to include all diagnoses of "pregnancy with abortive outcome" (ICD-10 codes O00-O08) over a six-year period, 2000–2005. These include diagnoses of spontaneous and induced abortions, ectopic pregnancies, trophoblastic disease and other unspecified abortions. The

chapter describes the source of these data in some detail; demonstrates the types of morbidity measures that are available in Mexico (such as state-specific hospitalization rates); and discusses potential advantages and limitations of the data.

It is essential to keep in mind that our chapter covers morbidity related to all pregnancy loss, not just morbidity related to induced abortion. As long as these inclusion criteria are clear, the method is a valuable and easily reproducible technique of generating a comprehensive measure of morbidity.

Descriptive Overview of the Method

Health Systems Used

In this chapter, we assess the utility of using health system data to measure morbidity from pregnancy loss. The objective of the method is to better document both the burden of morbidity from pregnancy loss borne by women who are treated in public-sector hospitals and the burden on health facilities that provide such care.

In Mexico, data on services provided by the public health sector are available through local and state hospitals that submit data to the central-level agency, the Federal Ministry of Health (MoH). The four main public-sector health institutions reporting to the MoH are the Secretaría de Salud (SSa); the Instituto Mexicano del Seguro Social (IMSS-Regimen Ordinario, or IMSS-RO); IMSS-Oportunidades (IMSS-O); and Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE). The populations covered by each of these institutions are the following:

- all people who lack coverage in a social security system or private health insurance are eligible for coverage by the SSa through federal or state hospitals, or by the IMSS-O system in rural areas of 17 selected states;
- government employees are served by the ISSSTE; and
- private-sector employees are covered by the IMSS-RO, which is paid for by the government, employers and employees.

Each system has its own budget and operating rules, including ways of registering data on patient care (Londono and Frenk 1997). A new program, known as Seguro Popular (Popular Health Insurance) was put in place in Mexico during the previous federal administration (2000–2006); eventually, it will replace the SSa under a mixed insurance program (Frenk et al. 2007). During the time period of the analysis, the Seguro Popular program had not yet covered a significant percentage of women who were hospitalized for obstetric reasons.

Starting in the late 1990s, the MoH created a strong centralized health information system, which includes a mortality and morbidity database with subsystems for hospitalized/inpatient cases, outpatients and emergency care in the whole health sector.* With this new system, all admissions resulting in hospitalizations are recorded in the Sistema Automatizado de Egresos Hospitalarios (SAEH, or Automated System of Hospital Discharges). The above-mentioned public health institutions (SSa, IMSS and ISSSTE) and others must report their data to this system. Some systems, however, have been slow in incorporating their data into SAEH and still rely on their old parallel information system. For example, both IMSS institutions use the Sistema Único de Información (SUI, or Unified Information System), while ISSSTE uses its Anuarios Estadísticos (Statistical Yearbooks).

Some additional segments of the public health system did not report data to SAEH for the complete study period and are therefore excluded from the present study. These are Petróleos Mexicanos (PEMEX), Secretaría de la Defensa Nacional (SEDENA) and Secretaría de Marina (SEMAR). However, we were able to review data for a four-year period (2004–2007) whose first two years overlapped with our last two years; the data corroborated that these three minor health institutions contributed less than 1.6% of overall hospitalizations due to pregnancy losses over the four-year period. All the above-mentioned systems are managed by the Federal Ministry of Health's General Directorate of Health Information.†

We included in our analysis those IMSS hospitalizations that were registered in their information system (SUI) but not reported to SAEH, mainly pregnancy losses attended in health facilities (hospitals and health clinics) in IMSS-O. While such hospitalizations were not routinely recorded in the period analyzed here, they are now included in a separate system called SIS (Sistema de Información en Salud, or Health Information System, form SIS-SS-12-P), which was available for consultation starting in 2007.

All these sources of information, which feed into SAEH, are presently accessible to the public through an online system known as Multi-Dimensional Online Analytical Processing (MOLAP); data included in the MOLAP are statistical digests that are updated yearly,

*For more detailed information, see <http://dgis.salud.gob.mx/sidies/>.

†Information about the Health Information System is available at <http://www.sinais.salud.gob.mx/> and <http://dgis.salud.gob.mx/cubos.html>.

according to ICD codes. MOLAP does not contain raw data on the services that are provided to each individual patient but summaries of the care provided; accordingly, potential analysis of data is limited to the variables that are available in the system (e.g., diagnostic codes, health institution type, federal entity and patient age-group).

Through a separate database, MOLAP gives researchers access to data on outpatient ambulatory care provided by public-sector facilities. These data are not included in our study because they were not regularly provided for the period analyzed. Recently, we reviewed data for the most recent year available (2008) and found that outpatient care accounts for less than 0.5% of all pregnancy-loss cases attended in the SSa and for less than 5% in the IMSS, mainly among IMSS-O patients. Finally, MOLAP does not include services provided by private-sector facilities. Researchers wishing to carry out analyses using variables others than those directly available through MOLAP or who want to integrate diverse sources of information should request access to the system's primary databases.

We analyzed MOLAP data to calculate the numbers of hospitalizations for all types of pregnancy loss and the percentage of obstetric cases they represent in public-sector hospitals in Mexico during a six-year period (2000 through 2005). Data from national population surveys and corresponding population projections conducted by Consejo Nacional de Población (CONAPO 2006) on the number of women aged 15–44 were used to calculate the denominator for the rates.

Because the data in the systems refer to hospitalizations rather than women, the method does not allow us to identify repeat hospitalizations by individual women. Thus, our unit of analysis is "cases" rather than "women."

Input Data: Diagnosis Codes

We used the current version of the ICD-10, which was adopted by Mexico in 1998, to diagnose morbidity from pregnancy loss up to 20 weeks' gestation (WHO 2007b). First, we selected all cases involving women aged 15–44 who received hospital care and then identified those that were diagnosed as obstetric cases (ICD-10 codes O00 to O99). Next, we narrowed the obstetric cases to the "pregnancy with abortive outcome" categorization under the following ICD-10 codes: O00—ectopic pregnancy; O01—hydatidiform mole; O02—other abnormal products of conception; O03—spontaneous abortion; O04—medical abortion, which includes legal and therapeutic termination of pregnancy; O05—other abortion; O06—unspecified abortion; O07—failed attempted abortion; and O08—complications following abortion. As mentioned earlier, no systematic attempts were made in this analysis to separate out induced abortions from all pregnancy losses.

ICD-10 data were combined from the four major public-sector institutions in Mexico: SSa, IMSS-RO, IMSS-O and ISSSTE. MOLAP was used to generate data tables for the three variables of interest: the number of cases diagnosed with codes for "pregnancy with abortive outcome" by health care institution, what percentage of obstetric admissions in public-sector institutions they account for; and the hospitalization rate per 1,000 women aged 15–44 for the country as a whole and by state, for the six-year period, 2000–2005.

National and state-specific rates were calculated for each year by dividing the total number of cases with the relevant diagnoses in all four institutions among the total female population aged 15–44 at mid-year (June 30th), and then multiplying by 1,000. The year-specific rates for each state over the period were summed and divided by six (the number of years in the study period) to arrive at an average, state-specific rate for the period 2000–2005; the same process was used to calculate the national-level hospitalization rate for the same time period.

We emphasize that we use the term "complications" in the strict medical sense denoted by the ICD-10 system. Although the abortion literature uses the general word "complications" to mean any morbidity serious enough to warrant hospitalization, we use the term to refer only to hospitalizations for pregnancy loss *other* than fourth-character decimal subcategories of .4 "incomplete, without complication" and .9 "complete or unspecified, without complication" (WHO 2007b).

These criteria give us the following diagnoses of "complicated cases": the fourth-character decimal subcategories of .0, .1, .2, .3, .5, .6, .7 and .8 for ICD-10 codes O03–O07 and the entire O08 category (see Appendix for the detailed ICD-10 categories used for complicated cases). Whether the woman was diagnosed upon arrival at the hospital or later during her hospital stay cannot be determined from this data set. The overall level of complicated cases was calculated as the proportion of cases with the above-mentioned ICD-10 subcategories among all pregnancy-loss hospitalizations.

Projections

We projected hospitalization rates and numbers for pregnancy loss for 2006–2010 based on rates observed in 2000–2005. We decided to use three mathematical models to project future hospitalization numbers according to prior trends. Time is the only factor considered in projecting future rates in this specific instance; we assume that no significant changes occur in the legal or public health context. The three models are:

1) Exponential model:

$$Y = \beta_0 \exp(\beta_1 time)$$

2) Second-grade polynomial model:

$$Y = \beta_0 + \beta_1 time + \beta_2 time^2$$

3) Third-grade polynomial model:

$$Y = \beta_0 + \beta_1 time + \beta_2 time^2 + \beta_3 time^3$$

where Y is the hospitalization rate due to pregnancy loss and time takes the following values: 0 = 2000; 1 = 2001; 2 = 2002; 3 =2003; 4 = 2004 and 5 = 2005 (observed rates); and where β0 , β1 , β2 and β3 are the parameters (rates) to be estimated.

After running these models and obtaining the parameter estimates, we projected hospitalization rates ($\hat{Y}$), substituting time = 2006 through 2010. Finally, after obtaining the projected annual hospitalization rates, we calculated the annual number of cases using population projections for 2006 to 2010 (Partida 2006), according to the following model: $X = \hat{Y} * WRA / 1{,}000$, where X is the absolute number of cases, the hospitalization rate is estimated as described above and WRA is the total number of women of reproductive age (15–44). These are arbitrary mathematical models that are frequently used to project indicators such as rates (Canavos 1998; Devore 2005). The specific models used can be adapted to researchers' needs and should be selected according to observed trends; however, their validity should always be tested against future empirical data.

The results from the models are reasonable given the assumption of unchanging national conditions, although they may not apply to Mexico City, where progressive legislation has been in place since 2007. However, should state abortion laws change dramatically or access to medication abortion become severely restricted, alternative scenarios would need to be constructed.

Results

National-Level Hospitalization Rates, 2000–2005

A total of 13,288,396 patient records for all women aged 15–44 who were hospitalized (with any diagnosis) were obtained for 2000 through 2005 (data for total hospitalizations were not available for IMSS-O); 9,922,860 cases involved a diagnosis related to pregnancy or delivery and of these, 1,010,212 were diagnoses of "pregnancy with abortive outcome" (i.e., ectopic pregnancies, molar pregnancies, miscarriages, unspecified and induced abortions). According to MOLAP data, one out of 13 cases of reproductive-age women attended in the public health sector were diagnosed with "pregnancy with abortive outcome"; these accounted for 10.2% of all obstetric admissions (see Table 1; all tables, figures and appendices are at the end of the chapter).

The annual number of hospitalizations for "pregnancy with abortive outcome" in the four major health systems rose from 162,732 in 2000 to 178,490 in 2005. The SSa experienced the greatest increase in hospitalizations with this diagnosis, growing from 72,124 cases in 2000 to 95,704 cases in 2005. The other health institutions experienced a slight decline in the number of cases, reflecting a similar decline in total hospitalizations among the insured population over the same period of time (data not shown). Discharges from IMSS-RO for pregnancy-loss morbidity declined from 72,556 cases in 2000 to 69,423 cases in 2005; the comparable numbers in the ISSSTE went from 9,295 to 7,025; and discharges from IMSS-O went from 8,757 to 6,338 (Table 2 and Figure 1).

Mexico's annual average rate of hospitalization for "pregnancy with abortive outcome" for 2000–2005 was 6.7 hospitalizations per 1,000 women aged 15–44. This national rate remained relatively constant over time, despite the increase in the absolute numbers of cases over the six years that occurred simply because of population growth.

As mentioned above, we did not attempt to examine the data by specific type of pregnancy loss since the accuracy of coding is likely undermined by many reasons, with the stigma associated with induced abortion being first and foremost. For example, we reviewed the diagnostic subcategories used in SSa institutions for the study period (data were unavailable for the whole health sector) and found that 9% of all hospitalizations for pregnancy loss were classified as miscarriages, a little less than 5% as ectopic and molar pregnancies, and the remaining 86% as "other abnormal products of conception (O02), "other abortion" (O05) and "unspecified abortion, which includes "induced abortion not otherwise specified" (O06). The extent to which this 86% includes actual induced abortions is unknowable.

State-Level Results, 2000–2005

The hospitalization rate for all abortive outcomes varies greatly across states, with the State of Mexico having the lowest rate (4.3 hospitalizations per 1,000 women) and Aguascalientes, the highest rate (10.9, Figure 2). Some of this variation is likely caused by differences in access to hospital care and in the numbers of women traveling across state lines for care. Such travel creates high spurious rates in "receiving" states and correspondingly low spurious rates in "sending" states. This situation is clear in Mexico City's very high rate, which likely reflects the influx of women from the surrounding State of Mexico, which has the lowest rate of any state. However, there are also important empirical differences across states. For example, the four states with the next lowest rates of pregnancy-loss hospitalization, the southern states of Guerrero, Puebla, Veracruz and Oaxaca, have especially big marginalized, rural and indigenous populations (Figure 3). Unsurprisingly, the large preferred family size in these states is likely associated with limited contraceptive use

and when unplanned pregnancies do occur, relatively few women are likely to resort to induced abortion. Moreover, in the event that women in these states attempt to interrupt a pregnancy and develop complications, lack of access to medical care means that the rates of hospitalization will be low.

Prevalence of Complicated Cases

Most women hospitalized for morbidity from all abortive outcomes of pregnancy were registered as "without complications" (i.e., as designated by use of .4 and .9 subcategories), which indicated that the symptoms, while requiring hospitalization, were not severe. However, approximately 9% of all cases were classified as "complicated" according to ICD-10 codes (see Appendix). Some differences by type of institution emerged in the prevalence of complicated cases, which ranged from 1% of pregnancy-loss hospitalizations in IMSS-O hospitals to almost 20% in ISSSTE facilities (Table 3).

Overall, the absolute numbers and percentages of complicated cases according to ICD-10 diagnosis subcategories are relatively low. In particular, when we analyze complicated cases in the entire subcategory of O08 (O08.0 through O08.9) for the whole health sector in the last two years of the study period, complicated cases involving trauma (coded as O08.6, which specifies damage to pelvic organs and tissues) accounted for less than 0.02% of all hospitalizations for pregnancy loss in 2004 and 2005. Further, three other specific types of complications—shock (O08.3), renal failure (O08.4) and metabolic disorders (O08.5)—together accounted for an additional 0.05% (data not shown). The extremely limited prevalence of trauma to the uterus and pelvic organs in 2004 and 2005 could be explained by current use of relatively safe and noninvasive methods to induce abortion, especially medication abortion. It is also possible that use of specific ICD codes is not entirely standardized and may vary across areas of the country and within health care systems. Unfortunately, we were unable to draw any conclusions about trends in complicated cases over time since we lack similar data for earlier years when reliance on misoprostol and manual vacuum aspiration were not widespread in the country. To our knowledge, similar data are also unavailable in other countries.

Projections for Future Years

As previously described, three mathematical models were used to generate projections of the number of pregnancy-loss cases that can be expected in the four major public-sector health institutions, given the trend in rates observed from 2000 to 2005 and the expected growth in the number of women of reproductive age. In all three models, projections resulted in increasing demand for services. The total expected number of cases in 2010 for the four public health systems ranges from 184,133 based on the exponential model to 333,400 based on the third-grade polynomial model.

Demand will likely vary by institution, as it has in the past. For example, for the SSa only, which had the highest number of pregnancy-loss cases in 2005, the projection based on the exponential model (which results in the most conservative scenario) yields an increase from 95,704 in 2005 to 98,729 in 2010. The projection based on the second-grade polynomial model shows an intermediate increase to 113,473 pregnancy-loss cases in SSa hospitals by 2010, and the projection based on the third-grade polynomial model yields the highest estimate of 178,764 cases for 2010 (data not shown). Increases would likely be less pronounced in the other three health institutions, which started out in 2005 with far fewer cases than the SSa.

When tested against an updated analysis of all hospitalized pregnancy losses in 2006–2008, these projections show that the actual case load lies very close to model 2, which would yield 211,629 cases for the whole health sector by year 2010 (Figure 4).

Discussion

Like any health system database, the Mexican database used in this analysis suffers from the limitations of incorrect diagnosis classification and underregistration of cases. As mentioned earlier, our data slightly underestimate the national total because they exclude hospitalizations in small public institutions (i.e., PEMEX, SEDENA and SEMAR) whose data were unavailable for the first three years of our study period (i.e., they started routine reporting only in 2004 and their records are still inconsistent). Our data also omit outpatient cases since such data are not reported under SAEH in the MOLAP system (they started being included in 2007); private-sector services are also excluded.

Nonetheless, Mexico's MOLAP system has become progressively more accurate and complete over time and provides researchers with access to a single national database without needing to go to each individual health system. This allows for relatively easy analysis that can be done repeatedly and has no need for fieldwork. The method thus saves time and money in research efforts.

The six-year data show interesting trends over time and important differences by state and health institution. The data obtained through this methodology clearly show no change in the absolute numbers or rates of hospitalizations for all pregnancy losses in Mexico over

a recent six-year period, with a mean annual rate of 6.7 hospitalizations per 1,000 women aged 15–44. Even though our data include *all* pregnancy losses, and are not solid enough to differentiate among the various types of losses, they do suggest that much, perhaps most, of the morbidity stems from unsafely induced abortion. As such, the data reflect the extent to which Mexican women resort to induced abortion to resolve unwanted/unplanned pregnancies.

The results of our study cannot be directly compared with those from other studies that have estimated numbers and rates of hospitalizations for induced abortion for the following reasons: a) we do not attempt to separate out induced abortions and include *all* hospitalizations with ICD-10 diagnoses of "pregnancy with abortive outcome," including miscarriages and pathological events, such as ectopic and molar pregnancies, which are most likely to require hospitalization; and b) our data exclude women who receive care in an outpatient setting. These reasons likely explain the difference between our data and those from a study that used the indirect Abortion Incidence Complications Method (AICM) and MOLAP data to estimate a rate of 5.7 hospitalizations for induced abortion per 1,000 women aged 15–44 in 2006 (Juarez et al. 2008).

Our projections of the expected demand for services in the five years following the analysis period show an upward trend, indicating that the Mexican health systems need to continue to invest in quality postabortion care. Investment includes training personnel and using cost-effective technologies and best practices that have been recommended by international health agencies. Of particular importance are the steps that need to be taken by the SSa, which provides health care for the largest and poorest sector of the population and will be responsible for the bulk of postabortion care in the future. In addition, national health programs must place continuous and strong emphasis on strategies to prevent the root cause of induced abortion—unplanned pregnancy—by continuing to invest in solid, accessible, user-friendly and high quality family planning programs.

Methodological Considerations

Data Needs

Obtaining the data

To apply this method in a given country, researchers need access to reliable information about services provided in hospital settings that are disaggregated by detailed ICD-10 codes and age-group. Depending on the country and the system, the data may be accessed as public information (i.e., available through printed reports or electronic files) or the data may need to be requested from the relevant health authorities. No representative sample needs to be selected, nor are time-consuming and costly data collection efforts required.

In addition to calculating absolute numbers of hospitalizations, rates should be calculated if population denominators are available. For comparisons with rates estimated by international organizations such as the WHO, reproductive age should be defined as ages 15–44; however, many countries consider women aged 15–49 to be of reproductive age.

Ethical issues

The MOLAP system data used in this methodology represent aggregated statistical information. Since their use does not require access to patients' clinical histories, the system contains no confidential information that could present ethical problems for women or researchers. Special care is taken by the MoH to ensure that this publicly available system lacks confidential information that could link the data to an individual patient. Institutional Review Board or other types of ethical review are not needed, since direct contact is never made with women and the data that are used do not contain any identifying information.

Data coverage considerations

This method uses data on all women who are hospitalized in public health facilities with diagnoses of "pregnancy with abortive outcome" (up to 20 weeks' gestation) according to the current ICD-10 definition. As mentioned above, since Mexico is a country where induced abortion is both highly restricted by law and highly stigmatized, women and health professionals are understandably reluctant to label a pregnancy loss as an induced abortion. Therefore, we decided to not differentiate between specific diagnostic categories and included all abortive outcomes, which encompass miscarriages, obstetric pathologies and incomplete or unspecified abortions. Having accurate and reliable data on specific diagnoses would permit analyses that differentiate among subcategories and that focus on specific patients (for example, those hospitalized after induced abortions or unspecified or incomplete abortions).

As mentioned earlier, the MOLAP data available through SAEH do not include outpatients (that is, women who are not hospitalized) nor do they include women who obtain treatment from private-sector providers. Clearly, for a full national total of all morbidity from pregnancy loss, the data need to include inpatients and outpatients in facilities in both the public and private sectors.

Considering these limitations and the explicit shortcoming of the methodology in including all abortive

outcomes (miscarriages and obstetric pathologies), we assume that any existing bias should be uniform across years, states and health institutions. Researchers who wish to apply the method to their specific context should be aware of the data specifics they are using and ensure that sources of data and diagnostic criteria are consistent and uniform across areas and over time, or know how to adjust for differences.

Subjects/study population

The population included in our analysis is women of reproductive age. As mentioned before, many countries define this age-range as 15–49 years; however, international organizations generally use the 15–44 age-range. Researchers could choose to use both ranges to optimize comparability with other studies. When calculating rates, care must be taken to use the same age criteria for both the women experiencing the event analyzed (hospitalization for pregnancy loss) and the population of women in the denominator.

Data quality considerations

Data quality depends on several conditions:

- Providers' accurate knowledge and use of the ICD-10 codes to classify diseases or conditions presented by patients.
- Health facilities' capacity to register and enter the data without bias or error and in a timely manner. Where stigma against induced abortion is great, it may influence which diagnostic code is used—that is, personnel may be more likely to diagnose a pregnancy loss as a spontaneous, incomplete or unclassified abortion, rather than as an induced abortion. In low-resource contexts, where researchers may lack access to computers and the Internet, the data may have to be extracted manually at first and then keyed into electronic files for analysis.
- The ability of the health system itself to detect possible errors and inconsistencies and to correct them.
- The ongoing assessment of data quality, with feedback to those who are responsible for data compilation and processing.

Past applications of similar methods

Analysis of data on hospitalizations for postabortion care is needed to estimate the overall incidence of induced abortion, as is done in the AICM developed by the Guttmacher Institute. Studies from 1990 through 2005 that measured abortion-related hospitalization rates for 13 countries have been recently synthesized (Singh 2006). Some of these studies used data from official data systems similar to Mexico's and others relied on aggregate data from nationally representative sample surveys of health facilities that provide postabortion care. However, these efforts differ fundamentally from our approach in their removal of hospitalized miscarriages and obstetric pathologies to yield a hospitalization rate for induced abortions only.

A similar national-level analysis was carried out using data from Brazil's information system (DataSUS) on postabortion care provided in public hospitals (Adesse and Montero 2008).

Strengths and Limitations

Robustness of results

The robustness of the resulting indicators and estimates depends directly on the quality of the data used. In the case of Mexico, health information systems in general and the MOLAP system in particular have evolved and been strengthened over the years. The information they contain has been increasingly used by researchers and is considered a valuable tool for decision making.

The overall data may be useful for the type of general analysis we describe but may become less robust for more detailed analyses, i.e., when specific diagnostic categories and types of morbidity are needed.

Application of the method in Mexico resulted in differences across states, pointing to possible data registration problems (such as those caused by movement across states for hospital care) or to real state differences in women's need for such care and their access to it, or a combination of both. To determine what really is happening at the state level, a specific in-depth study is required, such as an analysis using a subsample of hospitals to analyze the state of residence of women who seek care and/or to detect inconsistencies in documentation and data entry.

Most developing countries are increasingly improving and strengthening their official health system databases to improve evidence-based decision making and policy making. The approach described here takes advantage of that effort and provides a valuable resource for understanding patterns and trends over time in hospital-based care of pregnancy loss. Greater efforts are needed to improve the data quality, including ensuring that registration of the reason for admission is complete and that reporting is done accurately.

Extent of underestimation and other limitations

The stigma against induced abortion is so strong that even the estimates of pregnancy losses generated by this official database are likely underestimates since, for example, losses may not be registered as such but as

dysfunctional uterine bleeding. In general, patients can be misdiagnosed, resulting in an underestimation of the need for care. They can also be misclassified by receiving diagnoses that do not fall within the ICD-10 categories included here and that omit essential information about the final status of the fetus—i.e., with ICD-10 codes denoting hemorrhage in early pregnancy (code O20), threatened abortion (O20.0) and unspecified hemorrhage in early pregnancy (ICD O20.9).

It is also essential to make clear that ICD-10 classification defines "pregnancies with abortive outcome" as those that end before 20 weeks of gestation; thus, terminations of pregnancies after 20 weeks and late miscarriages are classified as fetal deaths (ICD-10 P95 and P96.4) or late hemorrhage, and would not be captured in the total counts presented here.

On the other hand, our inclusion of *all* ICD-10 categories for "pregnancy with abortive outcome" results in a certain degree of overestimation, since miscarriages and specific obstetric pathologies (molar and ectopic) are also counted. According to our analysis of SSa data only, these may account for approximately 14% of all pregnancy losses in our information system.

Again, the main weakness stems from our inability to distinguish between different types of pregnancy loss. The method does not separate out miscarriages from abortions, or even among induced abortion, it cannot distinguish those that were unsafely induced from those that were "safely" induced but led to more bleeding than the woman expected, as is often the case with misoprostol. Thus, specific analyses and comparisons between different types of pregnancy loss, which are grounded in complex social, clinical and biological experiences, cannot be made. The characteristics of the states' legal frameworks, their populations and the people using services at different health institutions could vary in ways that would benefit from a breakdown of the different types. Unfortunately, this is not possible with current data.

Feasibility and ease of use

One of the important characteristics of this method is that it uses health system data that are publicly available, free of charge and posted online, at least in the case of Mexico. Since no original data collection is needed, the method is highly cost-effective and can be extremely fast to implement. The technical skills needed to use the methodology include knowledge of the ICD-10 classification system and the country's official health information system, and the ability to navigate online and to generate tables and create crosstabs through MOLAP. No fieldwork is required, nor are surveys or interviews with providers, key informants or health authorities. In specific cases, the researcher may need access to primary sources of data that feed into the MOLAP.

The method is feasible as long as it is clearly understood that interpretation of the results, such as explaining why rates differ by states and by health institution, requires additional quantitative and qualitative research. Several hypotheses for the variation in rates across states and health institutions are possible and need to be empirically verified, such as differences in access to care according to women's socioeconomic status and place of residence and differences in the quality of data (classification and registration) according to institution.

Since no fieldwork is required and the staff involved is limited to professionals with public health, epidemiological and computer expertise, no training is needed. Analysis and interpretation of the data require a person familiar with the complex human event under study—abortion.

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TABLE 1. Among women aged 15–44, all hospital admissions, all obstetric admissions and admissions for "pregnancy with abortive outcome," public-sector institutions, Mexico, 2000–2005

Public health institution	*All admissions among women of reproductive age*	*Obstetric admissions (and % distribution by institution)*	*Obstetric admissions as % of all admissions among women of reproductive age*	*Diagnoses of "pregnancy with abortive outcome" (and % distribution by institution)*	*Diagnoses of "pregnancy with abortive outcome" as % of all admissions among women of reproductive age*	*Diagnoses of "pregnancy with abortive outcome" as % of obstetric admissions*
SSa	5,632,439	4,005,972 (40.4%)	71.1%	492,022 (48.7%)	8.7%	12.3%
IMSS-RO	6,982,395	4,820,578 (48.6%)	69.0%	424,611 (42%)	6.0%	8.8%
IMSS-O	u	680,579 (6.9%)	u	45,161 (4.5%)	u	6.6%
ISSSTE	673,562	415,731 (4.2%)	61.7%	48,418 (4.8%)	7.2%	11.6%
Total	13,288,396	9,922,860 (100%)	74.6%	1,010,212 (100%)	7.6%	10.2%

Sources: **for SSa**—Dirección General de Información en Salud (DGIS), Sistema Automatizado de Egresos Hospitalarios; **for IMSS**—Sistema Único de Información, Subsistema 13; **for ISSSTE**—Anuarios Estadísticos. *Note:* u = unavailable.

TABLE 2. Numbers and rates of hospitalizations for "pregnancy with abortive outcome" by year and public health institution, Mexico, 2000–2005

Year	*Public health institution*					*Mean no. of women aged 15–44**	*Hospitalization rate for "pregnancy with abortive outcome" (per 1,000 women)*
	SSa	*IMSS-RO*	*IMSS-O*	*ISSSTE*	*All*		
2000	72,124	72,556	8,757	9,295	162,732	24,290,547	6.70
2001	75,236	73,214	8,743	8,411	165,604	24,660,557	6.72
2002	79,331	71,046	7,841	8,426	166,644	25,012,935	6.66
2003	83,409	69,459	7,126	7,980	167,974	25,346,509	6.63
2004	86,218	68,913	6,356	7,282	168,769	25,660,064	6.58
2005	95,704	69,423	6,338	7,025	178,490	25,953,480	6.88
2000—2005	492,022	424,611	45,161	48,418	1.010,212	150,924,092	6.69

*Number of women at mid-year (June 30th).

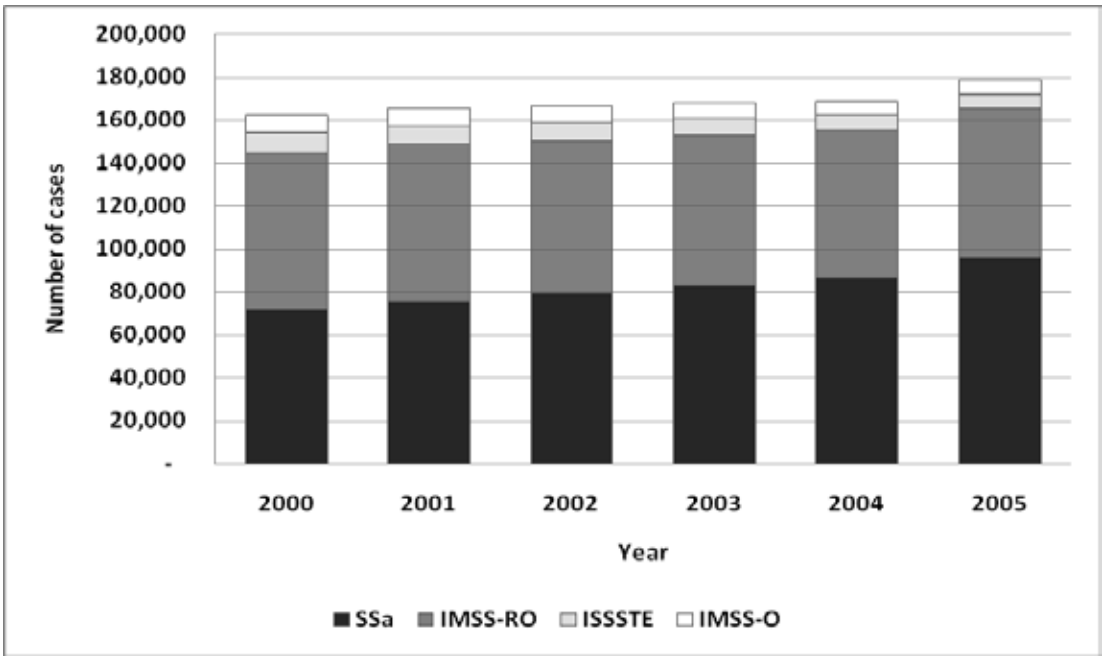
Sources: **For numbers of hospitalizations**—see Table 1. **For numbers of women**—http://www.conapo.gob.mx/index.php?option=com_content&view=article&id=36&Itemid=234.

TABLE 3. Among all hospitalizations for "pregnancy with abortive outcome," percentage diagnosed as complicated cases per ICD-10 codes,* Mexico, 2000–2005

Health institution	%
IMSS-O	1.4
IMSS-RO	4.8
SSa	9.9
ISSSTE	18.7
Total	8.9

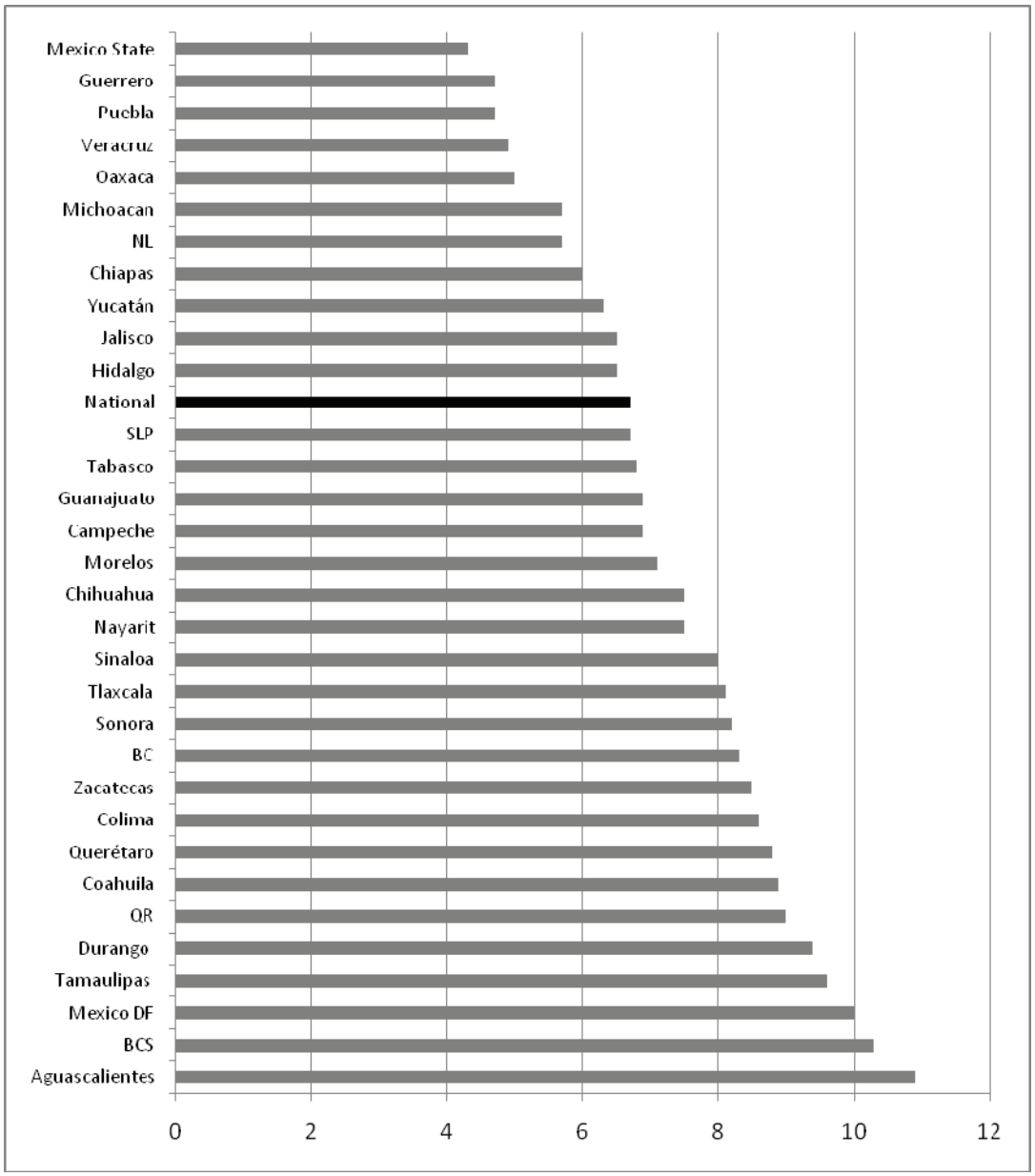
*See Appendix for diagnostic codes denoting complicated cases. *Sources:* see Table 1.

FIGURE 1. Number of admissions for diagnosis of pregnancy loss, by public health institution, Mexico, 2000–2005



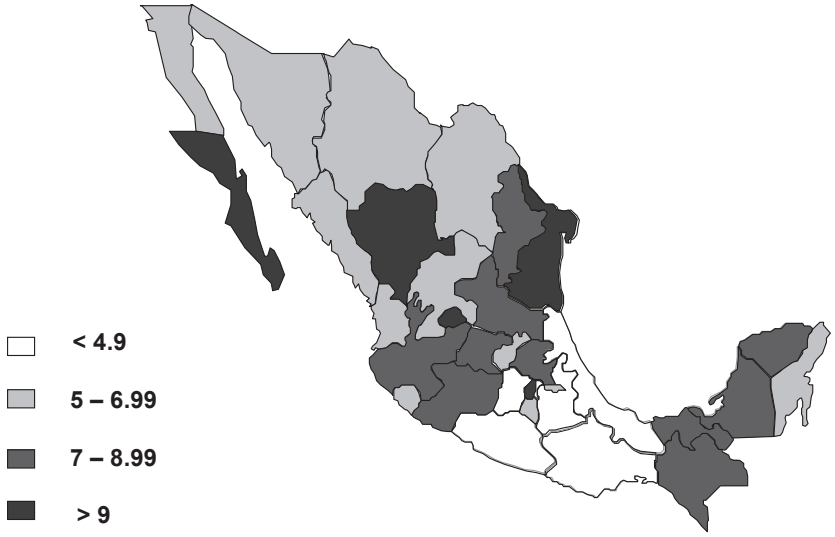
Sources: **for SSa**—DGIS, Sistema Automatizado de Egresos Hospitalarios; **for IMSS**—Sistema Único de Información, Subsistema 13; **for ISSSTE**—Anuarios Estadísticos.

FIGURE 2. State- and national-level hospitalization rates per 1,000 women aged 15–44 for "pregnancy with abortive outcome," Mexico, 2000–2005



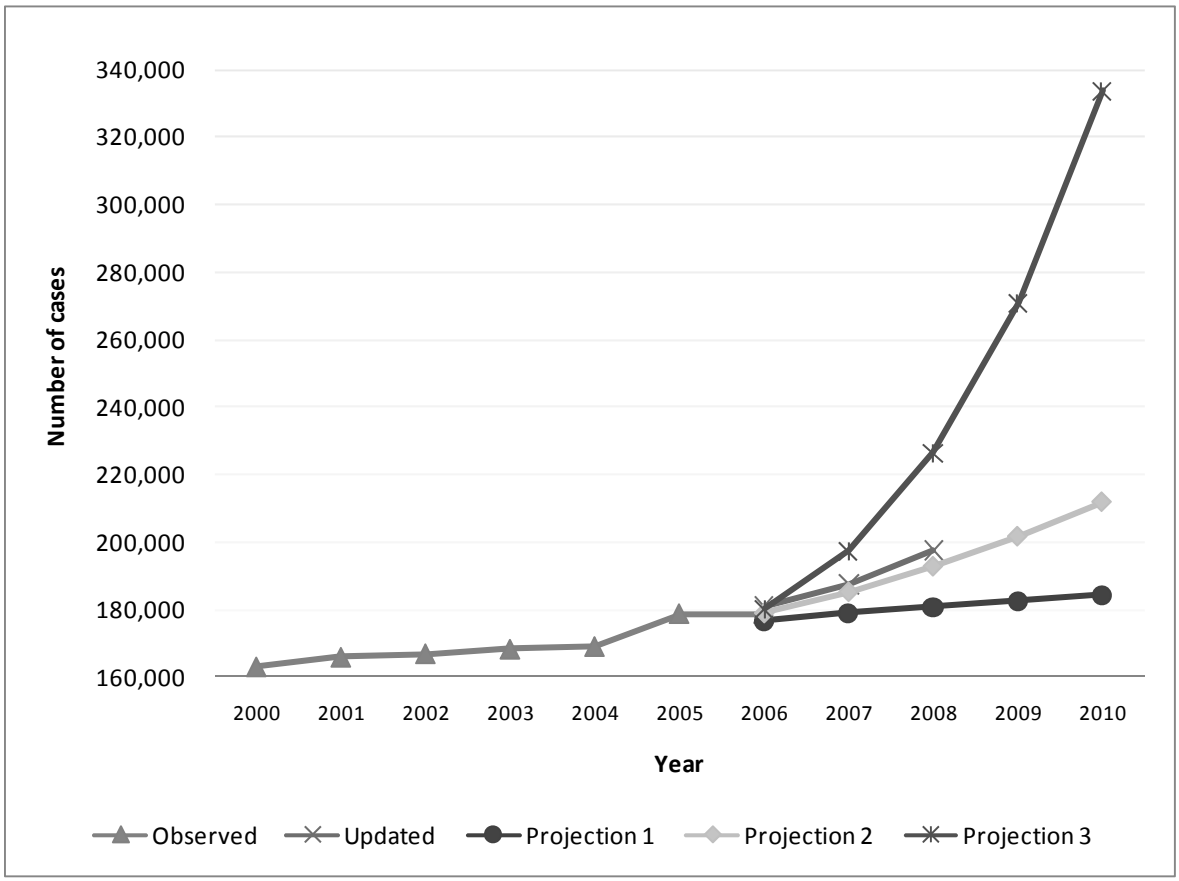
Sources: See Table 1.

FIGURE 3. Map of Mexico showing state-level hospitalization rates per 1,000 women aged 15–44 for "pregnancy with abortive outcome," 2000–2005



Sources: See Table 1.

FIGURE 4. Health system data on admissions for pregnancy loss for 2000–2005 and projected admissions for the period 2006–2010, public health institutions, Mexico



Notes: Observed cases refer to health system data for 2000–23005; data were updated using 2006–2008 health system data. Projected cases were calculated using the following models: 1: Exponential model: $Y=\beta_0 \exp(\beta_1 \text{time})$. 2: Second -grade polynomial model: $Y=\beta_0 + \beta_1 \text{time} + \beta_2 \text{time}^2$. 3: Third-grade polynomial model: $Y=\beta_0 + \beta_1 \text{time} + \beta_2 \text{time}^2 + \beta_3 \text{time}^3$.

APPENDIX. ICD-10 diagnostic codes used to classify hospital admissions for complicated cases of "pregnancy with abortive outcome"

O03	**Spontaneous abortion**
O03.0	Incomplete, complicated by genital tract and pelvic infection
O03.1	Incomplete, complicated by delayed or excessive hemorrhage
O03.2	Incomplete, complicated by embolism
O03.3	Incomplete, with other and unspecified complications
O03.5	Complete or unspecified, complicated by genital tract and pelvic infection
O03.6	Complete or unspecified, complicated by delayed or excessive hemorrhage
O03.7	Complete or unspecified, complicated by embolism
O03.8	Complete or unspecified, with other and unspecified complications
O04	**Medical abortion**
O04.0	Incomplete, complicated by genital tract and pelvic infection
O04.1	Incomplete, complicated by delayed or excessive hemorrhage
O04.2	Incomplete, complicated by embolism
O04.3	Incomplete, with other and unspecified complications
O04.5	Complete or unspecified, complicated by genital tract and pelvic infection
O04.6	Complete or unspecified, complicated by delayed or excessive haemorrhage
O04.7	Complete or unspecified, complicated by embolism
O04.8	Complete or unspecified, with other and unspecified complications
O05	**Other abortion**
O05.0	Incomplete, complicated by genital tract and pelvic infection
O05.1	Incomplete, complicated by delayed or excessive hemorrhage
O05.2	Incomplete, complicated by embolism
O05.3	Incomplete, with other and unspecified complications
O05.5	Complete or unspecified, complicated by genital tract and pelvic infection
O05.6	Complete or unspecified, complicated by delayed or excessive haemorrhage
O05.7	Complete or unspecified, complicated by embolism
O05.8	Complete or unspecified, with other and unspecified complications
O06	**Unspecified abortion**
O06.0	Incomplete, complicated by genital tract and pelvic infection
O06.1	Incomplete, complicated by genital tract and pelvic infection
O06.2	Incomplete, complicated by embolism
O06.3	Incomplete, with other and unspecified complications
O06.5	Complete or unspecified, complicated by genital tract and pelvic infection
O06.6	Complete or unspecified, complicated by delayed or excessive haemorrhage
O06.7	Complete or unspecified, complicated by embolism
O06.8	Complete or unspecified, with other and unspecified complications
O07	**Failed attempted abortion**
O07.0	Failed medical abortion, complicated by genital tract and pelvic infection
O07.1	Failed medical abortion, complicated by delayed or excessive haemorrhage
O07.2	Failed medical abortion, complicated by embolism
O07.3	Failed medical abortion, with other and unspecified complications
O07.5	Other and unspecified failed attempted abortion, complicated by genital tract and pelvic infection
O07.6	Other and unspecified failed attempted abortion, complicated by delayed or excessive haemorrhage

APPENDIX. ICD-10 diagnostic codes used to classify hospital admissions for complicated cases of "pregnancy with abortive outcome" (continued)

O07.7	Other and unspecified failed attempted abortion, complicated by embolism
O07.8	Other and unspecified failed attempted abortion, with other and unspecified complications
O08	**Complications following abortion and ectopic and molar pregnancy**
O08.0	Genital tract and pelvic infection following abortion and ectopic and molar pregnancy
O08.1	Delayed or excessive haemorrhage following abortion and ectopic and molar pregnancy
O08.2	Embolism following abortion and ectopic and molar pregnancy
O08.3	Shock following abortion and ectopic and molar pregnancy
O08.5	Metabolic disorders following abortion and ectopic and molar pregnancy
O08.6	Damage to pelvic organs and tissues following abortion and ectopic and molar pregnancy
O08.7	Other venous complications following abortion and ectopic and molar pregnancy
O08.8	Other complications following abortion and ectopic and molar pregnancy
Source: http://www.who.int/classifications/apps/icd/icd10online/.	

CHAPTER 12

Quantitative Measures of Self-Reported Data on Abortion Morbidity: A Case Study in Madhya Pradesh, India

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Measuring levels of abortion-related mortality and morbidity poses many challenges in the developing-country context. Where abortion is legally restricted or where most legal abortions occur outside the formal health care system, official records of abortion gathered at legal health facilities miss a large proportion of abortions and related morbidity. Stigma surrounding pregnancy termination means that women are reluctant to report abortions on standard population surveys, which also leads to underestimates of the true incidence of abortion (Baretto et al. 1992; Johnston 2002; Rossier 2003). Further, self-reported abortion morbidity can only be measured among women who have survived the abortion attempt and cannot capture the experience of women who die from the most severe complications. Given these challenges, it is not surprising that the published literature on abortion-related morbidity, particularly in developing countries, is slim.

While data on abortion-related morbidity is relatively limited, existing studies examining such morbidity have used a wide range of methodologies. These include small, in-depth qualitative studies with women and health providers (Ramachandar and Pelto 2004); mixed-method approaches with women identified as having had an abortion (e.g., Ganatra and Hirve 2002); facility-based documentation of abortion complications (e.g., Jewkes et al. 2005); surveys of women who have sought reproductive health services at facilities (e.g., Ahmed et al. 1999; Mitsunaga et al. 2005); clinical trials comparing side effects resulting from surgical and medication abortion (e.g., Elul et al. 1999); and global estimations of a given aspect of morbidity, for example rates of hospitalization for complications of induced abortion (e.g., Singh 2006).

Morbidity Measures

A variety of measures have been used to classify morbidity and its severity, depending on the characteristics of the sample, methodology of data collection and who is reporting or measuring the morbidity (e.g., a clinician versus the woman herself). The measurement of the severity of morbidity in formal health care settings typically is based on clinical observation of well-defined symptoms (for examples, see Jewkes et al. 2005; Rossier et al. 2006). In contrast, measuring the severity of self-reported morbidity, either in qualitative studies or through quantitative surveys, is less clear cut. Asking women to report morbidity in clinically defined terms is often not feasible, as many women never receive formal medical care and among women who do, many may not know the clinical terms for their complications.

Women may also rank severity differently than medical providers and only report what they consider to be "out of the ordinary." Symptoms that are significant or severe enough to be recalled may also differ across cultures, by urban/rural setting and by whether and how pain is managed (Elul et al. 1999). Further, asking a woman to describe specific symptoms and their duration many years after they occurred may introduce recall error. However, an abortion and any related complications are likely highly significant and vivid events in a woman's life, which means self-reports of abortion are probably less susceptible to recall bias than are other events.

Studies that have collected self-reported morbidity data typically ask women about a simplified list of clinically defined abortion complications; some also ask about disruption of daily life as a result of those complications. The typical range of simplified "clinical" signs and symptoms reflects the commonly clinically defined complications of unsafe abortion—bleeding, fever, foul smelling discharge, pain, incomplete abortion and trauma/physical damage to the body.

Questions on bleeding generally specify a level of bleeding, either in terms of severity or duration. For example, respondents have been asked about the amount and time frame of bleeding (i.e., severe/profuse or prolonged/continued) (Elul et al. 1999; Ramachandar and Pelto 2004); the number of weeks of moderate to heavy vaginal bleed-

ing (Johnston et al. 2003); and how bleeding compares with menses (greater than, equal to or less than) (Coyaji et al. 2002). Pain is also usually specified, typically in terms of a location (e.g., abdominal, lower back). A few studies ask about weakness and most add a general "other" category. Some ask about timing or duration of complications (Elul et al. 1999; Mitsunaga et al. 2005) and others assess whether the complications occurred at the time of the abortion or within six weeks (Mitsunaga et al. 2005).

Several studies also ask women about disruptions to daily life that result from abortion-related complications (Ganatra and Hirve 2002; Johnston et al. 2003; Ramachandar and Pelto 2004), with only a few studies reporting the actual duration of those disruptions (Ganatra and Hirve 2002; Johnston, 2002; Ved et al. 2003). Typical measures of disruptions to women's daily lives revolve around the ability to undertake daily activities, such as cooking and caring for children (Elul et al. 1999) or whether the woman had to take bed rest as a result of complications (Ramachandar and Pelto 2004).

While there is similarity in the type of questions asked regarding symptoms or disruptions to daily life, there is no particular uniformity in what is asked and how it is asked. In addition, most studies take only one of the above approaches to measuring morbidity, thereby focusing on relatively narrow definitions and types of morbidity. More exploration is needed of the various measures of self-reported morbidity, how they compare, the advantages and disadvantages of different types of questions, and the essential questions to ask in a survey setting. Gaining a fuller understanding of morbidity by standardizing self-reported morbidity measures is central to comprehending women's experience of abortion-related complications, designing effective programs and being able to assess these efforts.

Exploring Self-Reported Morbidity

The following section uses a case study from the Indian state of Madhya Pradesh to explore the implications of using different types of self-reported measures on levels and severity of morbidity resulting from abortion complications, for the overall sample and for urban and rural areas. India offers a unique opportunity to gather self-reported data on morbidity because induced abortion has been legal for generally interpreted broad reasons since 1972. However, the majority of women, especially in rural areas, are unaware that the procedure is broadly legal, and the situation is complicated further by onerous facility registration requirements, severely limited access and the widespread persistence of stigma. All this makes safe abortion much less accessible than would be expected in a country where the law allows it for a range of reasons. As a result, the majority of women who resort to abortion are never seen in the formal and legal health care system, particularly in rural areas.

Data

The data come from a survey conducted in 2002 in both urban and rural areas of Madhya Pradesh (see Edmeades et al. 2010 for more detail on the study). The sample consisted of 2,444 married women aged 15–39 with at least one child. Respondents were selected using a stratified, cluster sampling approach, with urban areas oversampled to enable analyses of differences between urban and rural areas in this predominantly rural state. In addition to gathering information on the characteristics of women and their households at the time of the survey, the survey collected retrospective longitudinal information on every pregnancy, resulting in a data set of 9,127 pregnancies with known outcomes. The survey further collected information on women's autonomy, household economic status, pressure from family members for continued childbearing and experience with abortion for each pregnancy.

As described in more detail in Chapter 3 of this volume and in a study by Edmeades and colleagues, the survey relied on an innovative, mixed-method approach designed to elicit higher quality abortion data than is typically the case (Edmeades et al. 2010). In particular, the survey was designed to mimic a "narrative" approach, which is more commonly used in qualitative research and allows women to naturally tell their "story" of each individual pregnancy. The approach was also structured to aid interviewers in developing a good rapport with the women and to use the flexibility of qualitative methods to generate data suited to complex quantitative analysis.

In total, an abortion attempt was recorded in 737 pregnancies (which were contributed by 552 women); because multiple attempts were made in some of these pregnancies, our data set includes information on a total of 1,053 individual attempts. Since our interest is in morbidity associated with abortion attempts, we excluded 87 attempts that involved women whose abortion request was refused and eight attempts where information on morbidity was incomplete; this resulted in a final data set of 958 individual abortion attempts. Moreover, our analysis is based on all abortion attempts, rather than on completed abortions only. (Of the 737 pregnancies for which abortion attempts were made, 67%, or 495, resulted in completed abortions.) A range of data was collected about each of these attempts, including whom the woman consulted, where she went, the advice and/or treatment she received, who paid for the abortion, whether complications developed, and the use of follow-up care and the source of such care.

Different approaches may be used to analyze these

data. Analyses may focus on a single attempt, for example, the last or the first attempt, or draw on multiple attempts among respondents who made more than one to abort a particular pregnancy. Moreover, the analysis may focus only on women who had a complete abortion or include both those whose abortions were completed and those who attempted an abortion but did not succeed. Our approach of including *all* attempts maximizes the information available by using attempts as the unit of analysis. However, the results should not be generalized to all populations, since women who have made more than one attempt may be different in some ways from women who succeeded at their first attempt.

Interviewer Training

The principal investigators conducted two weeks of intensive training, including field practice, with 18 experienced interviewers. The training process was structured around participatory principles, which allowed the interviewers to modify the questionnaire during the process of absorbing its structure and content. Because the questionnaire was administered in a narrative framework and the data were recorded in a survey format, interviewers needed to become skilled in flexibly administering it. This involved encouraging the respondent to tell her personal story while maintaining the recording structure and ensuring that all questions were covered in the course of the narrative. In order to accomplish this, interviewers needed to fully understand the content of the questionnaire, the challenges inherent in collecting abortion data and how the methodology addressed these challenges. Interviewers were also trained on issues of informed consent, confidentiality and the need to work through gatekeepers. Extensive quality control in the field was maintained through constant supervision by an experienced research officer as well as through frequent field visits by senior staff. The interviewers also relied on a training manual developed by the research team as a reference for addressing both complex and simple issues.

Review Board Approval

The study was reviewed and approved by the International Review Boards of the Indian Council for Medical Research and the Government Medical College of Nagpur, following standard submission procedures.

Background on Abortion Attempts

Abortion was common in this sample of women in Madhya Pradesh: Thirty percent of urban women and 21% of rural women had ever attempted to abort at least one pregnancy. Of these women, the vast majority had attempted to abort only one pregnancy, though 22% of urban women and 17% of rural women had attempted to abort more than one pregnancy. Similarly, most women (75%) made only one attempt to abort a specific pregnancy. Although more than two-fifths (42%) of first abortion attempts for a given pregnancy were initially unsuccessful, a further abortion attempt was made in less than half (47%) of these cases. Of all abortion attempts, 75% of attempts made in urban areas and 59% of those in rural areas ended in a complete abortion.

For each abortion attempt, women were asked to report the provider/place of that attempt and the method of abortion used. The distribution of attempts by provider type varied widely by place of residence: Among attempts made in rural areas, almost half (47%) were made by the woman herself, followed by attempts made by medical (private or public) providers (43%) and nonmedical providers (10%). It should be pointed out that private providers may or may not have been working in legally certified facilities or been adequately trained. By contrast, attempts made in urban areas were primarily made through medical providers (70%), 27% were made by the woman herself and 4% by nonmedical providers.

The distribution of the methods women used in their abortion attempts mirrors the patterns of provider type used by women in our survey. Abortion attempts by urban women were much more likely than those by rural women to involve a medical termination of pregnancy (MTP) (46% vs. 21%). In India at the time of the study, MTPs were primarily restricted to dilation and curettage (D&C). A large proportion of both rural attempts (39%) and urban attempts (30%) involved ingesting pills of some form, though women typically were unaware of exactly what was in the pills. (In this study, the only distinction we could make between pill types was malaria pill vs. other types of pills.) Although medication abortion (mifepristone) was legalized in India in February of 2002 (Duggal 2003), it was neither legal nor readily available in Madhya Pradesh for the bulk of the time period covered by this survey. Abortion attempts among rural women were almost twice as likely as those among urban women (40% vs. 24%) to be made using traditional methods such as herbs, hot food or drink, massage, jumping or falling, and carrying heavy loads. Less than 1% of attempts involved the insertion of an object into the vagina.

Measures of Morbidity

Three different measures of abortion-related morbidity were developed based on the data: symptoms of complications resulting from an abortion attempt, time on bed rest required to recover from these symptoms and a combined variable that incorporated both measures. Each of the three measures is an ordered categorical variable with

three levels of morbidity: none, moderate or severe.

The first measure is built on responses to the question "Did you have any complications/side effects from what you took/had done?* The criteria used to assign the level of morbidity as measured by symptoms of complications were the following: *Severe* includes attempts where women reported excessive bleeding together with four or more days of bed rest,† an incomplete abortion, infection and/or fever, or damage to the uterus, birth canal or vagina. *Moderate* refers to attempts where women reported excessive bleeding, pain, weakness or other symptoms in the absence of severe complications. *No morbidity* refers to attempts where no complications were reported.

The second measure is constructed from a question that asked whether these complications led to the respondent being bedridden. Specifically, women were asked "Were you bedridden or unable to get up for some period of time because of the complications or side effects? How long could you not get up?"‡ Abortion attempts that led to four or more days of bed rest were categorized as causing "severe" morbidity; attempts that resulted in between one and three days of bed rest were categorized as resulting in "moderate" morbidity; and those involving no bed rest were categorized as causing "no morbidity."

Based on the responses to the symptoms and bed-rest questions, a combined measure was constructed. Included in the combined morbidity level of "severe" were both attempts leading to "severe" symptoms and those resulting in "moderate" symptoms but categorized as "severe" in terms of bed rest. The combined "moderate" morbidity classification included attempts ranked as "moderate" on both the symptoms and bed rest–based measures. Finally, attempts where no symptoms of complications were reported and where no bed rest was required were categorized as causing "no morbidity." The percentage distribution of abortion attempts for each of these measures is shown in Table 1 (see tables at the end of the chapter).

As the table clearly demonstrates, how we measure abortion-related morbidity can make a substantial difference in how attempts are categorized in terms of the severity of their morbidity. This is important to researchers exploring the determinants and consequences of the morbidity caused by abortion attempts, as the conclusions they reach may differ depending on which measure is used. While the difference between these measures depends to some degree on how they are defined, the results suggest that even though the symptoms and bed-rest measures assess the same underlying morbidity, they capture distinct dimensions of morbidity and both differ from the combined measure.

To illustrate how distinct measures of morbidity influence the conclusions regarding the severity of morbidity and urban-rural differentials, we compared each measure against the others. This process highlights both the benefits and costs of using a combined morbidity measure versus each of its components separately.

Findings

The findings highlight the variability in the levels of morbidity, the extent of rural-urban differences and the range in the determinants of abortion-related morbidity, depending on the measure chosen.

Levels of Morbidity

Postabortion complications were common among the sample of women who attempted to abort a pregnancy. Table 2 shows the levels of self-reported morbidity associated with the three different morbidity measures in both urban and rural areas.

Using the measure of morbidity related to the symptoms of complications, approximately 46% of urban abortion attempts and 58% of rural abortion attempts resulted in some level of morbidity (including both moderate and severe morbidity). However, if morbidity is measured by days of bed rest only, the indicated level of morbidity drops to 29% of urban and 38% of rural abortion attempts. This difference in morbidity, of 17 percentage points and 20 percentage points for attempts in urban and rural areas, respectively, illustrates that if morbidity had been measured based on bed rest alone, a significant portion of total morbidity, as measured by self-reported symptoms, would have been missed.

The symptoms and bed-rest measures also perform differently when examining severity of morbidity, with marked differences by area of residence. For example, in rural areas, 29% of abortion attempts resulted in severe morbidity under the symptoms measure, compared with

*Response categories to this question were the following: no complication pain, excessive bleeding, unfinished abortion, infection/fever, weakness, damage to uterus/vagina/birth canal and other (specify).

†Because information on the amount or duration of bleeding was not collected, and classifying severity based on excessive bleeding alone led to classifying as "severe" a significantly higher proportion of abortions performed in government or private clinics than expected, we used the bed-rest measure to help dichotomize excessive bleeding into moderate or severe morbidity. That is, excessive bleeding together with four or more days of bed rest was classified as severe morbidity, whereas excessive bleeding with three or fewer days of bed rest was categorized as moderate morbidity.

‡Response categories included the following: no (none), 1 day, 2–3 days, 4–7 days and ≥8 days.

17% using the bed-rest measure. In urban areas, by contrast, there is virtually no difference between the two measures, as 12–13% of abortion attempts under either the bed-rest or the symptoms measure led to severe morbidity. Use of the combined measure (symptoms and bed rest together) increases the percentage of attempts classified as having severe morbidity in both urban and rural areas, indicating that not all attempts that lead to self-reported severe morbidity using one measure also do so under the other.

Each measure also provides a slightly different picture of moderate versus severe morbidity by area of residence. Under the symptoms measure, the urban-rural differential in severe morbidity is 17 percentage points (12% vs. 29%), but the differential by area of residence in severe morbidity under the bed-rest measure shrinks to just four percentage points (13% vs. 17%). Using the combined measure, the difference in severe morbidity by area of residence is not as striking as under the symptoms measure, but is still large (15 percentage points).

Table 3 provides the cross-tabulation of the symptoms and bed-rest measures, showing their degree of concurrence. Of note is that 5.0% of rural attempts versus 0.8% of urban attempts classified as having severe morbidity when measured by symptoms are classified as having no morbidity using the bed-rest measure. By contrast, 12% of rural attempts and 5.3% of urban attempts that result in severe morbidity based on symptoms are classified as leading to moderate morbidity based on bed rest. Moreover, morbidity for 4.7% of rural attempts and 7.2% of urban attempts is classified as severe under the bed-rest measure, but as moderate by the symptoms measure.

Morbidity by Provider and Method

Table 4 shows the differences between the three measures of morbidity for four types of abortion providers. For nonmedical providers (self and other*) the symptoms measure categorizes a higher proportion of attempts as resulting in both moderate and severe morbidity than does the bed-rest measure (e.g., among self-induced abortion attempts, 23–24% are classified as moderate or severe under the symptoms measure, compared with 10–14% under the bed-rest measure); the same general pattern holds true for private providers. For abortion attempts that occurred with government providers, however, the symptoms measure yields basically the same proportion causing severe morbidity as does the bed-rest measure (25–26%), even as the symptoms measure continues to generate higher proportions of attempts classified as moderate than does the bed-rest measure (27% vs. 19%). Indeed, the symptoms measure leads to larger proportions of attempts being classified as resulting in moderate morbidity than does the bed-rest measure for all providers, with the exception of those in the "other" category.

An important distinction also exists between the two measures as related to abortion method and associated severe levels of complications (data not shown). For example, surgical abortion attempts (primarily D&Cs) show a much higher rate of severe morbidity relative to attempts made through other methods (ingestion of pills and "other"†) when measured by days of bed rest. However, when measured by symptoms, the percentage of attempts with severe morbidity is roughly the same across abortion methods (25% each of attempts through surgical abortion methods and "other" methods, and 27% of attempts through ingestion of pills). When using the measure combining symptoms and bed rest, surgical abortion attempts also have significantly higher levels of severe morbidity than do attempts using other methods (43% of surgical attempts using the combined measure vs. 28–29% each of attempts involving ingestion of pills or "other" methods of inducing abortion).

Challenges in Measuring Abortion-Related Morbidity

Data on abortion-related morbidity among women who are never seen in the formal and legal health care systems are scarce, as are data comparing the experiences of urban and rural women. We were able to take advantage of a unique population-based data set that allowed for a more comprehensive picture of abortion-related morbidity than is typically available.

There are multiple challenges to measuring morbidity in a general population sample. The first is the typical underreporting of abortion in surveys, which often provide few cases of abortion-related morbidity to examine. While underreporting likely occurred in this survey as well, the narrative approach to data collection used in this study also (see Chapter 3) appears to be stronger at soliciting sensitive information than the more typical survey approaches. For example, this data set yielded a ratio of 5.5 abortions per 100 live births for Madhya Pradesh, compared with a ratio of only 1.2 based on data for the state from the 1998–1999 National Family Health Survey (NFHS-2) (Edmeades et al. 2010). Moreover, 4.7% of pregnancies included in our data resulted in an induced abortion, compared with 1.0% in the NFHS-2 survey data. This far higher level of abortion reporting allowed for a closer look at abortion-related morbidity in

*"Other" providers include all traditional abortion providers that do not offer modern medical treatments.

†"Other" abortion methods include a range of nonmedical methods, such as massage, herbal teas and traditional medicines.

a general population than is often possible.*

The second challenge revolves around the quality of self-reported morbidity data, especially in terms of how comparable the measures generated are to clinical definitions of morbidity. Retrospective reporting also raises issues of recall bias and causality. However, abortion and related morbidity are likely to be a highly significant event in a woman's life, which potentially lessens the chance for recall error. Moreover, while causality (the link between the abortion attempt and the reported morbidity) cannot be directly proven with self-reported data (as might be the case with provider-reported data), the fact that a woman herself attributes the complications to an abortion is significant and should not be discounted.

The third challenge is the lack of standardized and tested measures for self-reported morbidity. While the literature on self-reported morbidity is not vast, a range of studies have used a variety of methodologies and measures. Most studies ask women about a set of complications, using simplified terms, while a few add in a question about the resulting disruption of daily life. While the questions asked are generally similar, there is no consistency in the language used and the range of symptoms asked about; neither is there uniformity in how the question on disruption of daily life is framed. Moreover, studies have not explored how these two types of measures of morbidity relate to each other, which is a necessary step for moving toward comparable data.

Despite these challenges, our data and approach allowed for an in-depth exploration and comparison of self-reported morbidity as measured by symptoms versus bed rest, and what happens when these two measures are combined. Based on preliminary exploration, some differences between the measures are worth noting. First, the use of a single measure alone—symptoms *or* bed rest—would miss substantial proportions of overall morbidity. Whether that morbidity is classified as moderate or severe, in rural or urban settings, also varies substantially depending on the measure used. In rural areas, for example, a greater proportion of abortion attempts are classified as resulting in severe morbidity using the symptoms measure than the bed-rest measure; however, in urban areas, there is virtually no difference in severe morbidity by the measure used.

The specific measure used (symptoms versus bed rest) also leads to quite different results with different methods of abortion. For example, the symptoms measure produces similar levels of severe morbidity, no matter the specific method of abortion used. By contrast, when using the bed-rest measure, the proportion of attempts via surgical methods (primarily D&C) that result in severe morbidity is twice as high as the proportion of pill-based and "other" attempts. Potential reasons for this difference may include medical providers prescribing bed rest after a surgical abortion and that women having a surgical abortion likely have more family support which, in turns, enhances their ability to take bed rest after their procedure.

As might be expected, the combined measures leads to higher levels of "severe" morbidity, as it is more inclusive of both the symptoms and bed-rest dimensions of morbidity. However, using the combined measure also obscures important differences between the two types/degrees of morbidity. Overall, the results reveal the complexity of the relationships between abortion and morbidity, and suggest that there is much to be gained both by using two different measures of morbidity and a single measure that combines the two.

Our findings highlight the need to find better ways to capture data on abortion morbidity from samples that are representative of a population of women beyond those who attend health facilities. Further exploration of how to measure self-reported morbidity and standardize measures is needed to support the collection of these data, which are particularly important to understanding how women's lives are affected by the lack of access to reproductive health services in the developing world. Based on the findings presented in this study, we recommend that when collecting morbidity data outside clinical settings, a minimum of two different measures should be used: one that collects information on a set of simplified, self-reported symptoms that reflect clinical signs of abortion morbidity; and a second that captures how the morbidity disrupts women's daily life by asking about bed rest or being unable to conduct daily activities. For both measures, capturing some indication of the duration of the morbidity (e.g., how long a symptom lasted, how many days of bed rest were needed or how long a woman was unable to carry out daily activities) is essential for understanding the severity of the morbidity.

*It should be pointed out, however, that our data do not capture the abortion experiences of unmarried and childless women. We did not interview unmarried women, who are known to have high levels of abortion-related morbidity, because pretests showed that induced abortions among unmarried women is too sensitive a topic in the Indian context to produce meaningful data through direct interviews.

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TABLE 1. Percentage distribution of abortion attempts by level of morbidity, according to measure of morbidity, Madhya Pradesh, 2002

Level of morbidity	Measure of morbidity (N=958)		
	Symptoms (%)	Bed rest (%)	Combined measure (%)
None	45.9	64.6	45.9
Moderate	30.3	19.8	21.3
Severe	23.8	15.6	32.9
Total	100.0	100.0	100.0

Note: In this and all the following tables, all percentages have been adjusted to account for oversampling in urban areas.

TABLE 2. In both urban and rural areas, percentage distribution of abortion attempts by level of morbidity, according to measure of morbidity, Madhya Pradesh, 2002

	Level of morbidity			
Type of measure and area of residence	None (%)	Moderate (%)	Severe (%)	Total (%)
Urban areas (N=514)				
Symptoms	54.3	33.7	12.1	100
Bed rest	70.6	16.2	13.2	100
Combined measure	54.3	22.9	22.8	100
Rural areas (N=444)				
Symptoms	42.1	28.8	29.1	100
Bed rest	61.9	21.4	16.7	100
Combined measure	42.1	20.5	37.4	100

TABLE 3. In both urban and rural areas, agreement between the symptoms and bed-rest measures in the classification of morbidity level, Madhya Pradesh, 2002

		Bed-rest measure					
	Morbidity level	None (%)		Moderate (%)		Severe (%)	
		Urban (N=363)	Rural (N=275)	Urban (N=83)	Rural (N=95)	Urban (N=68)	Rural (N=74)
Symptoms	None	54.3	42.1	0	0	0	0
	Moderate	15.6	14.9	10.9	9.2	7.2	4.7
	Severe	0.8	5.0	5.3	12.2	6.0	11.9

TABLE 4. For four types of abortion providers and overall, percentage distribution of abortion attempts by level of morbidity, according to measure of morbidity, Madhya Pradesh, 2002

Measure and level of morbidity	Self (n=350) (%)	Government (n=147) (%)	Private (n=396) (%)	Other* (n=61) (%)	All (N=954†) (%)
Symptoms					
None	53.8	48.7	38.3	38.2	46.1
Moderate	22.5	26.6	42.5	17.4	30.2
Severe	23.7	24.8	19.2	44.4	23.8
Bed rest					
None	75.9	54.9	57.2	57.3	64.6
Moderate	14.0	19.1	26.5	20.3	19.9
Severe	10.1	26.0	16.3	22.3	15.5
Combined measure					
None	53.8	48.7	38.3	38.2	46.1
Moderate	20.35	10.0	27.7	11.9	21.1
Severe	25.9	41.3	34.0	49.9	32.9
Total	100.0	100.0	100.0	100.0	100.0

*By "other" providers we mean traditional providers or family members. †N= 954 because four cases were dropped due to missing data on provider type.

CHAPTER 13

Self-Reported Data on Abortion Morbidity: Using Qualitative Techniques with Community-Based Samples

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Capturing the health consequences of unsafe abortion is vital to understanding the toll that abortion's illegality takes on women's lives. Most of the information we have about morbidity in settings where abortion is illegal comes from women who seek treatment for postabortion complications at health facilities. These studies all have limitations. Namely, they miss the views and experiences of women who did not develop complications; those whose complications were too mild to require treatment; those with complications who do not seek care at all; those who receive care from informal sources; and those who die before they are able to seek care. To capture these missed experiences, we conducted a community-based qualitative study in two settings where abortion is highly restricted and is frequently unsafe.

The study aimed to understand why women with complications do not seek care from a modern medical provider;* the experiences of women who tried and failed to obtain modern medical care (including the amount of money spent and the steps they took to try to obtain care); the types of complications experienced by women who do not make it to a modern health facility; and the effects that abortion complications have on women's home life and work. The study also attempted to link the type of abortion method used with the specific complications that ensued. In settings where induced abortion is highly stigmatized and fear of legal repercussions is pervasive, we feared that women would be unwilling to talk about their own abortion experiences. To overcome this shortcoming, we also asked respondents about women whom they know (or know about) who have had abortion complications and their health-seeking behaviors.

Many factors affect whether a women will develop abortion complications and how serious they will be, including the abortion method(s) used, the skill of the provider, the gestational age of the fetus and the woman's socioeconomic characteristics. (These are proxies for determinants that are more difficult to measure, such as the safety of the abortion and the time it takes a woman to recognize she is having a complication and seek care.) Several factors can contribute to delays in seeking appropriate treatment or forgoing it altogether with sometimes fatal consequences: These encompass social and psychological factors such as fear that the abortion will become publicly known (in societies that outlaw abortion and attach high value to pregnancy), lack of knowledge about the seriousness of the complication(s), not having control over money to pay for the abortion treatment, lacking transportation to reach a facility and cultural preference for traditional care. Mistreatment or fear of mistreatment by medical personnel further dissuades women from seeking proper medical assistance in a timely manner, if at all (Jagwe-Wadda et al. 2006; Sáenz et al. 2006; Tombros et al. 2007).

In their review of abortion research methodology, Barreto and coauthors identify methodological challenges that apply equally to quantitative and qualitative studies on abortion (Barreto et al. 1992). The authors draw attention to the potential pitfall of the data misrepresenting who is having abortions if certain subgroups of women are less likely to consistently participate in a study or are differentially lost to follow-up. Even when women consent to be interviewed, some subgroups may talk more freely about abortion than others. The authors point out that abortion morbidity will be overrepresented if, for example, women with serious complications are more likely than women with mild complications to talk about their abortion experience. Finally, the authors stress the importance of a good rapport between the respondent and the interviewer, as well as the role that the interview location plays in making the respondent feel at ease.

Most studies measuring abortion incidence rely on facility-based samples, which are the most cost-effective samples to use. However, such samples cannot speak to

*A modern medical provider is a formally trained nurse, nurse-midwife or doctor. We do not consider pharmacists to be medical providers of postabortion care since they do not physically examine a woman who might come to them for treatment of a complication.

abortion complications that are not seen in a health facility. Several studies have attempted to capture abortion morbidity from community-based samples (Ganatra and Hirve 2002; Johnston et al. 2003; Ramachandar and Pelto 2004; Rossier et al. 2006; Nyblade et al. 2007; Bankole et al. 2007). In Ouagadougou, Burkina Faso, Rossier and colleagues found that 60% of women who had abortions experienced adverse health consequences, 14% of whom were treated in hospitals (Rossier et al. 2006). A population-based quantitative study conducted in the state of Madhya Pradesh, India, found that 50% of women who needed postabortion care did not receive it (Nyblade et al. 2007). Using a community-based sample in Nigeria, Bankole and colleagues found that 42% of women who obtained an abortion went to a nonprofessional provider, 25% experienced complications but only 9% sought treatment for their complications (Bankole et al. 2007). However, a weakness of these and other studies that rely on self-reports is not knowing whether the self-reported complications fit the clinical criteria of abortion morbidity. This could bias the results in either direction.

We chose a qualitative approach because qualitative research methods provide tools to explore experiences that are regularly underreported on quantitative surveys. This is certainly the case with abortion, which is culturally sensitive, socially stigmatized and legally punishable (Jones and Kost 2007). Qualitative methods are also able to elucidate processes that are difficult to capture in structured questionnaires, such as decision making about seeking abortion and postabortion care. Because women's reasons for not seeking or obtaining modern care are frequently complex, an open-ended instrument allowed for respondents' more complete elaboration of their experience. Our hope was that a qualitative approach would allow us to probe the respondent in ways that might reveal a better understanding of the situation.

Estimating Abortion Morbidity Among Women Who Do Not Receive Care: Uganda and Guatemala

Understanding the causes of delaying care is important, because the timing of care has an impact on the resources expended by the public health care system. If women delay seeking care for a serious injury, they will likely require more intensive interventions, which require more skilled personnel and consequently raises costs. Thus, to design appropriate interventions to both save money and improve women's health, we need to more accurately establish the elements that affect the likelihood of timely care—namely, the causes and severity of complications, women's reasons for not seeking care, the steps they take to treat complications and the barriers they face in seeking care. The Community Abortion Morbidity Study (CAMS) sought to capture these heretofore unknown factors in two disparate settings.

The Case Studies

In Guatemala and Uganda, abortion is illegal except to save the life of the pregnant woman. Very few legal abortions are performed in either country. Yet the abortion rates estimated for each country are relatively high—24 per 1,000 women aged 15–49 in Guatemala and 54 per 1,000 in Uganda (Singh et al. 2005; Singh et al. 2006). Before 2003, information about the health consequences of abortion in Uganda and Guatemala came from women who were hospitalized for postabortion care. Studies conducted at different points in time and in different parts of the countries yielded very similar postabortion complications—heavy bleeding, hemorrhage, sepsis, genital trauma, uterine perforation and cervical injury (Bazira 1992; Kinoti et al.1995; Grajeda et al. 1995; Mirembe 1996; WHO 2004; Prada et al. 2005). To assess abortion morbidity at the community level, the Guttmacher Institute, in collaboration with its regional partners, undertook a community-level study in 2003 in Uganda (with the Faculty of Medicine, Obstetrics-Gynecology Department, Makerere University) and in 2004 in Guatemala (with the Federación de Salud Infantil y Reproductiva de Guatemala, or FESIRGUA).

Study Methods and Design

In both study settings, data were gathered from community members and from formal and informal health care providers on the health complications of unsafe abortion—both among women who are treated in a facility and among those who do not make it to a formal health facility. The studies were conducted in an urban and a rural area of each country. The ethnic groups interviewed in Uganda included Lugandans and the Banyankole. The ethnic groups interviewed in Guatemala were Ladinos and the Kaqchikel; the latter is the second largest group of Mayan descent in Guatemala.

We employed a mixed-method qualitative approach that used focus group discussions (FGDs) and in-depth interviews (IDIs). While the IDIs were designed to elicit detailed information about respondents' personal abortion experiences and those of their acquaintances, the FGDs attempted to explore perceptions about abortion morbidity within the community as a whole (see Table 1; all tables are at the end of the chapter). The approach allowed us not only to test each instrument for its ability to capture the target behavior, but also to compare the data generated by each method.

We interviewed women of reproductive age because they are currently at risk for unwanted pregnancy and thus may have had an abortion relatively recently and

experienced health complications or know about the abortion experiences of their peer group. We restricted the reproductive age-group to 18–49-year-old women. Although women younger than 18 likely obtain abortions too, we excluded minors because the sensitive nature of the questions made it too difficult to obtain informed consent from parents or guardians. Due to cultural barriers that inhibit women or their partners from speaking about their own abortions, we also relied on women's perceptions of what takes place in the community. (More is said about this below.) Older women (50–60 years old) were also interviewed about their experiences when they were younger to provide perspective on how conditions may have changed over time (data not analyzed); these older women could also refer to women who may have had more recent abortion experiences, such as their daughters, other relatives or women in their community.

Men were included in the study because in traditional societies men play an important role in controlling women's access to reproductive health care, especially in Africa (Varga 2002; Kyomuhendo 2003; Nyanzi et al. 2005; Becker et al. 2006). When women are economically dependent on men, men are likely the ones who decide whether and when to provide money for postabortion treatment and its affiliated costs, including transportation and medical supplies and food to bring to the facility. And because men exert social control within their communities, we also needed to understand how their attitudes toward women who have abortions affect access to care. Table 2 presents the demographic characteristics of the IDI respondents.

We interviewed community-based health care providers who worked in the formal and informal health sectors to get their opinions, perceptions and views about abortion morbidity in the community, as well as to gauge the extent of stigma toward women who have abortions. These providers did not necessarily perform abortions or treat abortion complications. In Uganda, seven types of health care providers were interviewed: traditional healers, traditional birth attendants, drug shop employees/pharmacists, dispensary personnel, registered nurses/enrolled nurses (equivalent to a licensed practical nurse), midwives and doctors. In Guatemala, the providers were randomly selected based on a list prepared by the director of the partner organization, with the collaboration of health care promoters who worked in the study area. Four types of health care providers were interviewed there: midwives, drug shop employees, nurses and doctors (see Table 3).

In Uganda, only women participated in the FGDs, while in Guatemala, participants included women, men and health care providers. In Uganda, one focus group session in each study area, rural and urban, was conducted with women in each of the following four age-groups: 18–25, 26–35, 36–49 and 50–60, for a total of eight FGDs. In Guatemala, two FGDs in both the rural and urban study location were carried out with women aged 18–49 and 50–60 as well as one focus group with men and one with health care providers in each study location to yield a total in that country of 12 (see Table 4).

In both countries, efforts were made to recruit participants from areas that had large but widely dispersed populations to assuage participants' fears of being identified and preserve their anonymity. The samples were nonpurposive. In Uganda, permission to recruit participants was first obtained from the parish chief or the local parish council chairperson, who then recommended female counselors to work with the research team as field guides. With assistance from these counselors who were familiar with local residents, the study coordinator arbitrarily identified potential respondents.

In Guatemala, permission was obtained from the Secretary of Health at the municipal level, but their additional help was not needed since health workers from one of the affiliates of the partner organization knew the area very well. Every fifth household was selected. After identifying the potential participants, the coordinator used the screener to determine eligibility (see example of screening questionnaire, albeit the English-language one used in Uganda, Appendix A).

Methodological Challenges

Sociocultural obstacles

Researchers who conduct abortion research in settings where the procedure is highly restricted must contend with two primary barriers that constrain data collection. The first is fear of legal sanction among both women who have had an abortion and providers who have performed one. The second is the social stigma attached to abortion, which constrains women's willingness to talk about their own abortions as well as the probability that they would know about other women's abortions. The stigma stems from religious beliefs and cultural values, and the related pronatalism. Our FGD participants, men in particular, provided ample evidence of the stigma that women who have had abortions must endure. Such women are gossiped about and socially ostracized; chased away from home by their husband; and can even experience physical violence from a male family member. It is understandable that women who have had an abortion are desperate to keep it a secret.

Not surprisingly, very few participants in either country acknowledged having had or performed an abortion. Almost all participants who experienced an unwanted pregnancy themselves, or whose partner had, stated that the pregnancy was carried to term. However, in Uganda,

some study participants provided detailed information on others' abortions, which led the study team to suspect that these individuals were possibly describing their own abortion experience. Acknowledging an unsuccessful abortion, which would likely result in complications, appeared to be less stigmatized than admitting to a successful one and also seemed to occur more frequently.

Women who have had an abortion may be unable or unwilling to specify how they or someone else attempted to induce one. They may just not know what was done or be too scared to admit to intentionally trying to end a pregnancy. Furthermore, women likely cannot know the extent of damage they may have internally sustained (e.g., cervical trauma) and only describe vague, nonspecific complications such as weakness, inability to bend over, etc. Another problem is that women may have interpreted any medical information or diagnosis they received through the filter of traditional biological concepts. All these issues complicate collecting reliable data from women on abortion methods and complications.

Since so few women in either country spoke about their own abortion attempts and not all abortions result in complications, first-hand accounts of complications were few and far between. To attempt to address this weakness, we also asked about respondents' friends' experiences with abortion. Even gathering data about the experiences of friends proved to be difficult because women were so secretive about all abortions. We even asked about abortion in the general community, but respondents were unable to answer much and spoke only, if at all, of their friends' experience with abortion.

Since it was very difficult for respondents to speak about what women do in their community, we had to draw primarily on what respondents *heard rumored* to have happened and many were still unable to describe the steps that women take to treat abortion complications. The following exchange illustrates the difficulty in eliciting detailed information:

> *Interviewer (I): So, you only heard about the injection?*
>
> *Respondent (R): Yes, that's what they say. There was a girl who was pregnant and she had a shot and aborted but who knows how she did it. They say [the fetus] just came out and she hemorrhaged severely for a week.*
>
> *I: What did she do to stop the hemorrhage?*
>
> *R: Who knows!*
>
> *I: Didn't anyone say what medicine she took?*
>
> *R: No, they just say she was given herbs, but who knows if the midwife [did something].*
>
> *—Guatemala, interview with 26-year-old woman, rural area*

One has to wonder if the respondents knew more than they were letting on. Despite the field teams' best efforts to explain who they were and the purpose of their inquiry, suspicion of the researchers came from unanticipated sources. In both Uganda and Guatemala, women were leery of the tape recorders used to tape the interviews. In Guatemala, women believed that their recorded voices would be recognized. In Uganda, women believed that the recording device was a machine to detect whether they had had an abortion. (In both cases, the recorders were conventional cassette recorders as opposed to newer, digital recorders.)

Such suspicion led women to withhold their consent to be interviewed. In Uganda, the field team addressed these suspicions by demonstrating how the tape recorders worked and by interviewers' assurances that the recorders did not have any other powers. In Guatemala, women's interviews were played back to them to demonstrate that their recorded voices sounded different than their real-life voices. Yet there is no way to know if women in either country were fully dissuaded of their suspicions. Such unallayed suspicions, in fact, may have biased the sample of women who agreed to participate and influenced the answers women chose to give.

Certain segments of the study population appeared to be better equipped than others to answer the study questions. Women were more able than men or providers to speak about unsuccessful abortion attempts, an unsurprising finding given that anyone other than the woman herself is unlikely to know about unsuccessful abortion attempts. Thus, it is likely unadvisable to attempt to gather accurate information on steps women take to interrupt a pregnancy (or to treat abortion complications) from any individuals other than women themselves.

We also learned that men in these traditional pronatalist societies may just not have much information on the topic. None of the Guatemalan men acknowledged that their partners had had an induced abortion, a finding that was validated by women seldom discussing intending to interrupt a pregnancy with their partner: If a partner knew about a pregnancy loss, women related attempting to pass it off as a miscarriage. Yet if women did develop complications from an induced abortion, they were sometimes forced to tell their partner because they needed his financial support to pay for treatment. Thus, it is not surprising that men appear to have incomplete information on their partners' abortion experiences.

Just as men had incomplete information, so did the

providers, from whom getting information about abortion complication treatment proved very difficult. Almost all said that they refer women who are suffering from abortion complications to other providers because women often delay seeking care until they are extremely ill and need a higher level of care than most providers in our samples stated that they were able to give.

Both traditional and modern providers in our samples were unlikely to know about the full series of steps women take in their attempts to treat abortion complications, since providers generally encounter women at only one point in the chain of such steps. Modern medical providers likely see women only when they show up at the clinic or hospital. Because many women delay seeking care and also experience obstacles that create delays, some are in such poor health by the time they arrive that they are unable to provide any specifics about their abortion or symptoms, so providers need to get whatever limited information they can from whomever accompanied the woman to the hospital.

Even when women are able to respond to questions, they may be reluctant to admit to having had an abortion out of fear of being mistreated or turned in to the police. Whether women are unable to provide information or prefer to withhold it from medical doctors, the end result is the same—the failure to receive the most appropriate medical care. If providers offer treatment, they most likely do not know if the woman goes on to recuperate fully, unless they work in a clinic or hospital where they can follow up the woman until her discharge. However, traditional healers and pharmacists who treat complications with herbs or drugs are not in a position to know their patients' outcomes. Providers who refer their patients elsewhere have even less information about how their patients fare.

Language obstacles

Conducting research in languages other than the language of analysis creates a host of potential problems. For both countries, once the interview guides were finalized in English, the guides were translated—into Spanish and Kaqchikel in Guatemala, and Luganda and Runyankole in Uganda. Translation is especially problematic when the local language is not commonly written, as is the case with the local languages in our study. Thus, for parts of the interviews, interviewers who were fluent in these local languages had to simultaneously translate as they conducted the interviews. When they transcribed the interviews, they had to simultaneously transcribe and translate the interview content into the language of analysis.

Inaccuracies in the data may also result from language-specific concepts that do not lend themselves to translation or might be misunderstood by the translator. We are aware of the following examples: In Kaqchikel culture, where maternity is highly valued and childbearing is the essence of stable marriages, unwanted pregnancy is an unknown concept in social discourse. Unsurprisingly, Kaqchikel respondents did not speak about "abortion" per se. However, when probed about other women's experiences of menstrual delays, Kaqchikel respondents indicated that women use traditional methods to bring back their periods. Similarly, Spanish-speaking Guatemalan respondents spoke about pregnancy losses that occurred because they took herbs, drank tea or "hizo fuerzas" [made efforts] (such as lifting heavy things), but losses were not labeled as abortions. If researchers are unfamiliar with local terms, large portions of abortion experiences could be missed altogether.

Cultural context is also relevant to understanding how women refer to abortion complications, which may reflect a local body construct and thus be incompatible with how the body is viewed in the Western medical model. For example, the term *nabaana avunze,* which means "rotting uterus" in Luganda, came up frequently in the interviews in Uganda. In discussions with the local study team, the researchers learned that a rotting uterus in Luganda means a uterus that has been damaged or is necrotizing as a result of injury. In the short term, it can cause infection. If untreated, it can lead to long-term complications, including permanent damage to the uterus and its removal, damage to other organs and even death from sepsis. Thus, the lack of specificity of the term impeded analysis of which type of abortion complications respondents were referring to.

Implementing the CAMS Methodology

Implementing the methodology from inception (instrument design, sample design and finding an in-country research partner) to completion (analysis and write-up) is a lengthy process that can last anywhere from one (on an expedited schedule) to three years. Fieldwork may take longer if willing participants are hard to find—e.g., modern health care providers may be hard to recruit for a study on an illegal practice if there have been recent prosecutions.

Both data collection techniques employed in the CAMS methodology—focus groups and IDIs—yielded different kinds of information. Focus groups proved to be useful for shedding light on the following: stigma and its role in explaining delays in seeking treatment for abortion complications; health beliefs that can cause further delay; and traditional ways to treat abortion complications. Not surprisingly, respondents had less trouble talking about the least socially sanctioned abortions—those among young unmarried women who are not yet supposed to be having children. Respondents were less likely to talk about personal

reasons that may lead women overall to decide to have an abortion. FGDs appeared to be the most appropriate methodology to uncover traditional explanations for miscarriages (e.g., an unfulfilled wish or a terrible scare or shock) as well as to elicit a long list of traditional abortifacients.

Ethical questions might arise from the need to seek Institutional Review Board approval from the relevant entities. For example, the data collection might reveal a woman in need of health care for a chronic or acute condition related to an unsafe abortion. Although no immediate health need emerged in our research, individual study teams will have to decide what to do if it does.

Although it is best to find highly qualified fieldworkers to ensure the quality of the results, the need to conduct the interviews and focus groups in local languages greatly reduces the pool of applicants who can be hired. Fieldworkers' level of personal discomfort with and beliefs about abortion should be taken into account when selecting and training them. In settings where abortion is highly stigmatized, the majority of the population may be highly religious and pronatalist. Yet in these settings, the draw of working on the project may be enough to attract even a fieldworker who believes that abortion is wrong. Such attitudes need to be addressed head-on, so fieldworkers' possible antiabortion feelings do not discourage women from sharing their experiences or distort their representation of them.

The project costs include those to develop the fieldwork instruments and conduct the fieldwork—for example, money needed to identify and hire field staff; train interviewers and support their transportation and lodging costs in the field; and pay the stipends of interviewers and participants. The budget should take into account the location of the fieldwork (urban or rural) and allow for higher time-related costs in rural areas where the population is more spread out. The data processing costs include those for transcription, transcript cleaning, qualitative software, creating a coding structure, and coding and analyzing the data. Because of the large quantity of data that qualitative work produces, analysis is time-consuming and should be budgeted accordingly.

Another consideration in determining the feasibility of a CAMS study is participants' likely high level of fear and discomfort when speaking about induced abortion. Participants may be unwilling to speak about their own or others' abortions if the country has recently prosecuted providers or women. Similarly, where abortion is highly stigmatized, participants are unlikely to know about other women's abortions.

Community-based abortion morbidity research likely underestimates how often women experience untreated complications because stigma and fear of prosecution motivate women to keep such experiences secret. Even if a participant were to know that a friend, relative or community member had had an abortion, she may not be privy to details about that woman's abortion complications. Moreover, the frequency with which women end up seeing a modern provider may be overestimated if participants are more likely to know about successful attempts at obtaining modern care, which would falsely inflate the rate of facility-based care. Respondents may simply not know about unsuccessful attempts to seek care, which would underestimate the number of steps that women take. Since the number of women who were willing to speak about their own abortions in these samples was so low, a snowball sample might be a more effective way to recruit community members into a study assessing how often women develop complications but fail to obtain modern treatment.

Problems Analyzing Data on the Consequences of Unsafe Abortion

The following fundamental problems compromised the quality of the data we had hoped to capture on women with untreated complications: 1) the sample of providers was too small to analyze separately; 2) participants were unable to specify the abortion methods used and the complications that ensued; 3) participants could not specify the multiple steps, and the time frame between each step that women took in seeking treatment for complications; and 4) the period of time that women were prevented from performing their regular duties varied tremendously or was unknown (mainly because we lacked information about what constituted women's regular duties and information about women's pain thresholds and specific complications).

Difficulty analyzing providers separately

The IDIs captured a great deal of diversity among provider types, but the sample sizes were too small to allow us to distinguish between types of providers. For purposes of analysis, we separated providers into three categories: traditional providers (which include traditional birth attendants and traditional healers); drug shop/pharmacists/dispensary personnel; and modern medical providers (which include midwives, nurses, enrolled nurses and doctors). Therefore, rather than being able to draw finer-grained distinctions between the groups, we were left with rougher categorizations.

Difficulty linking abortion methods and complications

Knowing the cause of a woman's abortion complication can greatly assist doctors in treating the woman. Abortion complications result from the specific abortion method used, but many common complications (e.g., fever, pain and bleeding) can result from a variety of methods. Re-

spondents were unable to distinguish between incomplete abortions and more serious complications, such as a perforated uterus. Women's lack of specificity regarding abortion methods stymied our attempts to link abortion methods with specific complications experienced—pointing to one of the great challenges providers are faced with in their efforts to treat women presenting with complications.

Women frequently use multiple methods of varying effectiveness in their attempts to induce an abortion. Many of the methods described were used in combination or sequentially as women become more desperate and sought out increasingly more effective (and frequently more dangerous) methods. (For a discussion of the specific methods named in these two studies, see Sáenz de Tejada et al. 2006 and Jagwe-Wadda et al. 2006.) As the following exchanges show, traditional methods, typically herbal concoctions, were considered to be the main cause of both short-term health complications (e.g., vomiting, diarrhea, heavy bleeding) and long-term consequences (e.g., uterine cancer,* death):

> *Participant 1: I have heard many cases of women who die in the process of stopping pregnancies, especially those who use herbs.*
>
> *Participant 2: There is a girl I saw when I was young. She was given herbs by the traditional healer but she died.*
> *—Uganda, urban focus group, women aged 20–35*
>
> *Moderator: What methods of abortion do you think cause the most serious complications?*
>
> *Participant: Using traditional herbs may cause bigger problems because the fetus comes out in parts. Some parts are retained and they rot in the uterus. There is a person who I know, it happened to her, and she was taken to the hospital for evacuation. Since then she has never gotten pregnant again.*
> *—Uganda, rural focus group, women aged 20–35*

Complications were perceived to result from the incorrect or overdose of herbs, but participants were unable to specify the kinds of herbs used and what constituted an overdose. One of the reasons for this may be the power and respect that traditional healers wield in rural communities. Healers usually keep their treatments secret, and women may not be allowed to ask questions about the drug or herbs or feel uncomfortable doing so. Therefore, future research efforts may need to use a different approach to capture more accurate information on the use of traditional methods to induce abortion as well as treat abortion complications. For example, women and providers could be asked to show the interviewer the specific herbs and drugs that are sold to both induce abortion and treat any resulting complications. To address fear that respondents might have about revealing what they themselves did or what someone else did to attempt to induce an abortion, trust must be built between the respondent and the interviewer, which could be time-consuming.

Another approach would be direct observation—that is, having the researcher accompany a woman seeking an abortion and/or treatment after one. However, researchers might need to spend a long time in the community to be able to get this kind of access. Yet another strategy would be the "mystery client" technique where a fieldworker poses as a woman seeking an abortion or treatment for complications to see what kind of herbs/drugs are given to her. Depending on the study setting and project timeline and budget, a combination of several of these approaches could be used.

Difficulty learning the steps women take to both obtain an abortion and treat complications

Many women who are not seen in the formal sector attempt to obtain an abortion and treat their abortion complications on their own or seek care in the informal health sector. Some of these women eventually go to a modern medical provider, but some do not: No common set of steps to obtain an abortion or treat complications emerged. The steps' indistinctness and lack of definition in respondents' minds further complicated the data collection. Attempts at obtaining an abortion or treating abortion complications frequently began at home and included using the same drug(s) in increasing amounts or resorting to ever stronger concoctions over time, such as taking herbs in combination with other medicines or with bitter liquids. Additionally, many of the measures were used simultaneously. The few women who spoke about having an abortion and experiencing subsequent complications said it was hard to clearly recall what was done first and the steps that followed. One of the reasons for this lack of specificity may be that women may be trying to forget an unpleasant and likely scary experience, or be unwilling to varying degrees to discuss what took place. In addition, women may simply have been in crisis mode while trying to resolve the enormous problem of an unwanted pregnancy and, unsurprisingly, had a difficult time specifying details about a traumatic event, such as the amount of money they spent with one specific provider to obtain or treat an abortion.

Difficulty determining how long women are unable to perform regular duties

Distinguishing between abortion complications that have short- and long-term health consequences may help as-

*This was a perceived consequence of abortion in Uganda.

sess how long women are prevented from performing their regular responsibilities. The reason we attempted to gather this information was to be able to estimate Disability Adjusted Life Years (DALYs) to provide another measure of the costs of unsafe abortion. Yet there are problems with collecting this type of information. First, women who are asked to recall an experience that might have occurred a long time ago might not remember how long they could not perform specific tasks. Second, women who are relating the experiences of others may be unaware of exactly how long other women were laid up by abortion complications and exactly which tasks were impacted.

Many abortion complications, such as bleeding, fever and abdominal pain, can vary in severity. Furthermore, complications do not affect women equally: While abdominal pain may prevent one woman from carrying water, for example, the same pain may not affect another woman's ability to do so. Some women in Uganda spoke about being unable to have sexual intercourse for an extended period of time following an abortion complication, which led them to fear that their husband would seek sex elsewhere. This fear may have led women to resume sexual relations sooner than they felt physically comfortable doing, which complicated our gathering standard information on the experience. In future research, a list of household responsibilities might be used to prompt the respondent to specify how long a woman would be prevented from doing each chore. Yet even with these prompts, it may prove impossible to generate DALYs from postabortion complications through third-person data.

Conclusion

This chapter presented and analyzed the problems that arose when attempting to capture women's experiences of abortion morbidity in two settings with similar restrictions on abortion. Many of the methodological challenges we encountered may also apply to research efforts in other countries that have similarly restrictive abortion laws and strong stigma against abortion.

Qualitative results in particular are a product of a specific time and place. Their correct interpretation always requires understanding as much as possible about the methodology used to generate a given set of results. The various methodologies that have been tried to date to capture abortion complications and how women go about treating them all have strengths and weaknesses. Since doctors, especially foreign doctors, have access to both abortion patients and providers but may not have the same culturally constructed fear of dealing openly with abortion, they may be best-positioned to capture data about abortion experiences in settings where it is highly legally restricted.

Some promising qualitative methods are prohibitively expensive and time-consuming to carry out. A method that works well in a particular setting at one point in time may not succeed at a later date if the political situation and social attitudes surrounding abortion have changed. The sampling approach is ideally dependent on the research question that the study is trying to answer. For example, if the study is attempting to describe abortion complications within a community, then relying on women who succeed in obtaining care at a hospital underestimates the true extent of abortion-related morbidity. Yet due to the sensitive nature of the topic, finding the ideal sample may be unfeasible, so we may have to make do with a sampling frame that is as appropriate as possible given realistic constraints.

This study is suitable to carry out with men and women of reproductive age (including minors) in settings where unsafe abortion occurs. The greater the gender inequity in a given setting, the more important that men are included in the sample: In such settings, men's attitudes toward abortion and abortion complications will have a relatively greater effect on women's ability to get needed health care than in settings where the sexes have more equality (i.e., where women have their own financial resources and can travel alone). Health care providers are able to provide more specific medical information than study participants about abortion methods and types of abortion complications—and they can potentially even link the type of abortion a woman had to her specific complications. Providers may also be better able than community participants to speak to short- and long-term health consequences of unsafe abortion, since community members' responses are filtered through their perceptions of the relationship between abortion and other health problems that are not clinically linked to abortion.

Capturing abortion complications at the community level is most important in settings where abortion is illegal, the majority of abortions are unsafe and the national abortion rate is high. Yet fear surrounding speaking openly about abortion can undermine the ability to generate meaningful results. This research effort did not yield high quality data on the specific abortion methods that women use that result in complications; the steps women take in seeking treatment for complications; and the time that women with complications are prevented from performing their regular responsibilities (with its concomitant social and economic costs to the family). While we certainly know more than we did before about unsafe abortion in both locations where the CAMS was conducted, many holes remain in our understanding of women who suffer complications from unsafe abortion and who never are seen at a health facility.

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TABLE 1. Number of IDIs by study area and participants' sex and age-group, CAMS, Uganda and Guatemala, 2003–2004

Participants	Urban area	Rural area	Total
Uganda			
Health care providers	17	16	33
Women			
18–24	7	6	13
25–49	14	15	29
50–60	9	10	19
Men			
20–50	10	11	21
Guatemala			
Health care providers	8	8	16
Women			
18–30	7	7	14
31–45	7	7	14
45–60	7	7	14
Men			
18–60	7	7	14
Total	**93**	**94**	**187**

TABLE 2. Numbers of women and men participating in IDIs by characteristic, CAMS, Uganda and Guatemala, 2003–2004

	Uganda		Guatemala	
Characteristic	**Women**	**Men**	**Women**	**Men**
Total	61	21	42	14
Age				
18–24	13	3	5	1
25–39	19	11	21	8
≥ 40	29	7	16	5
Residence				
Urban	31	10	21	7
Rural	30	11	21	7
Education*				
Illiterate	4	0	2	0
< secondary	35	8	36	13
≥ secondary	22	12	4	1
Marital status				
Married/ in union	34	17	37†	13
Not married/ not in union	27	4	4	1
Religion				
Muslim	18	9	0	0
Christian	21	3	0	0
Catholic	20	7	20	9
Evangelical Protestant	2	1	21	5
Other	0	1	0	0
None	0	0	1	0

*Data on educational level missing (question not asked) for one male Ugandan respondent. †Data on marital status missing (question not asked) for one respondent.

TABLE 3. Numbers of health care providers participating in IDIs by characteristic, CAMS, Uganda and Guatemala, 2003–2004

Characteristic	Uganda	Guatemala
Total	33	16
Sex		
Female	25	10
Male	8	6
Type of provider		
Medical doctor	4	6
Nurse/enrolled nurse	7	2
Midwife	6	6
Dispensary personnel	4	0
Drug shop employee/pharmacist	4	2
Traditional birth attendant	4	0
Traditional healer	4	0
Works in health facility		
Yes	21	8
No	12	8
No. of years of experience		
<10	17	4
≥ 10	16	12
Type of care provided		
OB/GYN	24	13
General health care	27	3
Age		
18–24	5	0
25–39	15	4
≥ 40	13	12
Residence		
Urban	17	8
Rural	16	8
Education		
< secondary	7	6
≥ secondary	26	10
Marital status		
Married/ in union	20	9
Not married/ not in union	13	7
Religion		
Muslim	5	0
Christian	22	0
Catholic	0	12
Evangelical Protestant	0	3
Other	6	0
None	0	1

TABLE 4. Number of FGDs by area of residence and participants' sex and age-group, CAMS, Uganda and Guatemala, 2003–2004

Participants	Urban area	Rural area	Total
Uganda			
Women			
18–25	1	1	2
26–35	1	1	2
36–48	1	1	2
50–60	1	1	2
Guatemala			
Women			
18–49	2	2	4
50–60	2	2	4
Men			
18–60	1	1	2
Health care providers	1	1	2
Total	**10**	**10**	**20**

APPENDIX A.

UGANDA SCREENING QUESTIONNAIRE FOR WOMEN 18–49, WOMEN 50–60 AND MEN 20–50 (FGDs AND IDIs)

1. Date of elaboration of list: ___ (Month) ____ (Day) _____ (Year)

2. Name of district: _____

3. Name of sub-county: _____

4. Name of village: _____

5. Household number: _____

6. First name (for the purpose of this study) _____

7. Sex (interviewer tick accordingly):
   - Male ____
   - Female ____

8. What is your age? (interviewer tick accordingly). If age is unknown, estimate based on historical event at birth event.
   - 18–25 ____
   - 26–35 ____
   - 36–49 ____
   - 50–60 ____

9. FOR WOMEN AGED 18–25: Are you currently enrolled in a school? Yes__ No__

10. Have you ever had/ever fathered a child?
    - Yes: ___
    - No: ___

11. FOR WOMEN ONLY. Have you ever had a miscarriage?
    - Yes: ___
    - No: ___

12. FOR MEN ONLY. Have you ever been involved in a pregnancy situation?
    - Yes: ___
    - No: ___

13. Person willing to participate:
    - Yes: ___
    - No: __

14. Person selected for:
    - FGD ____
    - IDI ___

15. Person not selected for the study:
    - Did not meet the criteria ___
    - Did not want to participate ____

SELECTED PERSON FROM THE SCREENER PAGE

Household number: _____

First name: _____

Address: _____

_____

_____

Selection Criteria

For FGDs with 18–49-year-old women: selection criteria will be age and residence. That means, it doesn't matter if women ever had a child and/or ever had a miscarriage.

For IDIs with 18–60-year-old women: selection criteria will be age, residence and abortion experience. That means women who ever had a child and/or ever had a miscarriage (YES in either one or both Q. 10 and Q. 11 of screening questionnaire).

For IDIs with 20–50-year-old men: selection criteria will be age, residence and ever fathered a child or ever been in a pregnancy situation (YES in either one or both Q. 10 and Q. 12 of screening questionnaire).

CHAPTER 14

Misoprostol Use and Its Impact on Measuring Abortion Incidence and Morbidity

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Abstract

Misoprostol is an effective and increasingly popular medication abortion option, especially in developing countries where abortion remains legally restricted. Taking a pill is noninvasive and the method does not require sophisticated storage. In settings where abortion is legally restricted, women can purchase the drug at pharmacies, often without a prescription, and self-administer it. Yet measuring misoprostol use remains a methodological challenge, especially where women and providers are hesitant to report use and/or accurate hospital records of women presenting with complications are unavailable. The research community is interested in developing sound methodologies to quantify self-use of misoprostol to induce abortion, since its use can impact the measurement of abortion incidence and morbidity in complex ways. Substantial self-use of misoprostol to induce abortion can potentially both temporarily increase and/or ultimately decrease overall induced abortion estimates. To address this research challenge, we present three types of data methodologies—national pharmacy sales data sets; face-to-face interviews; and pharmacy-based "mystery client" studies. We explain each method with its corresponding advantages and limitations, and how to incorporate the resulting data into abortion estimates. Finally, we highlight challenges in disseminating findings about misoprostol in settings where abortion is legally restricted.

Introduction

Misoprostol (marketed as Cytotec) is a synthetic analogue of the prostaglandin E1 that entered the global market in the late 1980s and was originally produced for the prevention of gastrointestinal ulcers. It is now registered for this indication in more than 80 countries in the Americas, Europe and South Asia (Shannon and Winikoff 2004). But misoprostol also has gained widespread recognition for its off-label use as an effective abortifacient when used alone or with other drugs (e.g., mifepristone or methotrexate), particularly within the first nine weeks of pregnancy (Bracken et al. 2007; Grapsas et al. 2008, Middleton et al. 2005). Numerous studies over the past two decades demonstrate misoprostol's potential for use in other obstetric indications, including the prevention and treatment of postpartum hemorrhage and induction of labor (Blanchard et al. 2002; Prata et al. 2009; Harper et al. 2007).

Misoprostol has the potential to help reduce pregnancy-related morbidity and mortality, especially in low-resource settings where abortion remains legally restricted (Miller et al. 2005). A modeling exercise conducted in Latin America, Africa and Asia demonstrated that increasing the use of misoprostol for elective abortions could have a notable impact on abortion-related maternal mortality (Harper et al. 2007). In the Latin American region, which has lower maternal mortality than Asia or Africa, the study estimated that there would be a 26% reduction in maternal mortality if 40% of abortions were misoprostol induced. Furthermore, the extent to which misoprostol is used to induce abortions affects the accuracy of estimates of abortion incidence and related morbidity (Singh 2006). Since sound research on abortion incidence and morbidity is critical for effecting policy changes to further women's reproductive rights, we must recognize and try to account for misoprostol's impact on these data.

This chapter describes methodologies that rely on three information sources to estimate misoprostol use in settings where abortion is legally restricted: data on national pharmaceutical sales; face-to-face surveys of women and providers; and individual pharmacy-based studies that use fictitious clients. Drawing on recent examples of work conducted in Mexico and other Latin American countries where abortion is legally restricted, we discuss how to obtain and interpret data from different sources to estimate misoprostol use. We consider advantages and limitations of these techniques within the broader context of abortion research.

Few studies address how women's self-use of misoprostol can affect abortion estimates, especially in legally restricted settings. Existing studies that explore misoprostol use in several countries show that the drug is readily available and widely used to induce abortion. Most of these studies document its use in convenience samples

of women and/or providers in clinics, pharmacies and community samples. A hospital-based study conducted by Clark (2004) among obstetrician-gynecologists in Brazil, Jamaica and the United States found that 27% of providers used misoprostol to induce first-trimester abortions and 23%, second-trimester procedures. Most providers also used misoprostol for uterine evacuation after pregnancy loss (61%) and a minority used it for labor induction (46%). In a survey of women hospitalized for pregnancy loss in Fortaleza, Brazil, 48% were women who reported having tried to terminate their pregnancies; of these, 66% said they had self-administered misoprostol (Misago et al. 1998).

Given misoprostol's sale through pharmacies in many countries, pharmacy-based studies are useful in estimating the drug's availability and use, as well as in assessing pharmacists' knowledge and opinions of the drug. One such study used surveys of pharmacy staff and "mystery client scenarios" in a large Latin American city. It reported that 74% of staff spontaneously recommended an abortifacient drug when a client inquired about ways to self-induce abortion; almost 40% of these staff members recommended misoprostol (Lara et al. 2006a). Another study with a similar methodology was conducted among private pharmacies in Mexico and Bolivia. That study found higher levels of information about and availability of misoprostol in Mexico than in Bolivia, though a greater percentage of pharmacists spontaneously recommended it in Bolivia than in Mexico (52% vs. 35%) (del Paso et al. 2007).

An accurate assessment of the degree to which misoprostol affects estimates of abortion incidence and morbidity in a given geographic and sociocultural context is challenging and requires inputs from several perspectives. Several studies use data triangulation, or reliance on more than one methodology, to increase the validity of the measures of abortion incidence and morbidity (see Chapter 9). One noteworthy example is a study that used multiple data sources to estimate the impact of misoprostol use on the incidence of abortion complications in 2005 in two states in Mexico, Chiapas and Guanajuato (Lara et al. 2007).

Briefly, the data sources were hospital records of women treated for abortion complications; a survey of health care providers (who estimated the proportion of women who had had a misoprostol-induced abortion and were treated in public hospitals for complications); a pharmacy component; and national drug sales data. According to preliminary results, the percentage of hospitalized abortion cases that corresponded to misoprostol use was much higher in Chiapas than in Guanajuato (15.9% vs. 4.5%) (Lara et al. 2007). A related study mentioned earlier measured misoprostol's potential to reduce maternal mortality by modeling its impact in Africa, Asia and Latin America using prevailing mortality rates in the three regions. The exercise yielded different scenarios of low and high estimates of misoprostol's impact, depending on assumptions used in the models (Harper et al. 2007).

The Challenge of Measuring Misoprostol's Contribution

Now to the primary question of this chapter: How does misoprostol use affect the measurement of abortion incidence and morbidity? The short answer is that misoprostol can affect both measures significantly and in complex ways. In many settings where abortion is legally restricted, accurate data on misoprostol use are scarce and all we have is anecdotal evidence. We can, however, expect misoprostol use to affect abortion incidence estimates in one of two ways. First, if the true portion of all induced abortions that are self-induced with misoprostol goes undocumented, the result is an underestimate of all induced abortions in a given setting. In fact, in a study to estimate incidence by Juarez and colleagues in Mexico that took misoprostol into account, increased use of the drug actually was associated with increased abortion incidence (Juarez et al. 2008).

On the other hand, because hospital-treated complications are an important data source for indirectly calculating abortion, the measurement of abortion incidence may be affected by a temporary increase in such admissions resulting from three potential situations: women may not yet know how the drug works and thus seek hospital care believing that the normal symptoms of pregnancy termination are true complications; women may have bleeding and a complete abortion but decide to go for care to confirm that the pregnancy has ended; and women may have limited bleeding and go to the hospital assuming that they need treatment for an incomplete abortion. For example, a woman who is not well informed that the drug can take up to two weeks to work may seek hospital attention well before then and be registered in hospital records incorrectly as having had an "abortion-related complication."

In addition, the drug has some known side effects, even though they occur very rarely, as well as a small failure rate. Both could lead to real abortion-related complications and hospital admissions. It is logical that as more women self-administer misoprostol, the incidence of known drug-related side effects, such as excessive bleeding and cramping, will increase proportionately. Therefore, we may see a slight increase in hospital admissions for real misoprostol-related complications as well.

Misoprostol use also affects estimates of abortion-related morbidity by reducing the rate of serious complications that women otherwise would suffer from an unsafe

abortion (self-induced or obtained from a nonmedical provider), which is different from the temporary increase in spurious hospital complications in the above scenario where women seek care for what they believe are complications but are actually the normal effects of the drug. A retrospective study in Brazil with 1,840 women who obtained hospital-based postabortion treatment found the incidence of infection among women who had used misoprostol to be almost one-twelfth that of women who had used other methods (4.2% vs., 49.4%) (Faundes et al. 1996). In addition, given women's limited knowledge of misoprostol, they may experience real complications associated with taking the drug inappropriately, especially after the first nine weeks of pregnancy. For example, a study conducted in Rio de Janeiro among women who experienced abortion complications reported that 57% had self-administered misoprostol at a median dosage of 800 mcg (Costa and Vessey 1993). The most common reported reasons for seeking hospital care, which could have been normal side effects of the drug, included vaginal bleeding and cramping.

These studies illustrate how misoprostol can affect overall abortion incidence estimates and related data on morbidity. They highlight the importance of using sound methods to calculate misoprostol use. The next section describes three methodologies for measuring misoprostol use in legally restricted settings, as well as the pros and cons associated with each.

Data from National Pharmacy Sales

Type of Data and How They Are Obtained

Pharmaceutical companies in many countries maintain databases of national pharmacy sales to monitor sales trends of their products, including commercial drugs containing misoprostol. These databases offer a "big-picture" perspective on misoprostol sales volume, market share, types of sales (e.g., prescription or over the counter), types of units sold and other product characteristics that can be helpful in measuring use in a single year or over time. It is important to keep in mind that these databases are not universally available to researchers and also can vary in quality and level of detail, depending on the product and country. To understand the broader legal and political context in which the drug is being prescribed and dispensed, it is important to first confirm whether misoprostol is registered in the country and/or on a list of essential drugs.

In many countries, commercial research firms work with pharmaceutical companies and can access these databases. Researchers can contract these private firms to analyze national- and state-level information on misoprostol sales. This approach can be expensive; however, it is a good option especially when used in conjunction with misoprostol use data from other sources, such as surveys (detailed below).

What We Can Infer from These Data About Misoprostol Use

In settings where abortion is legally restricted, we can use national pharmacy sales data to infer several pieces of information critical to our understanding of misoprostol use. Key indicators include how sales trends vary over time at the national level in relation to trends in abortion incidence and treated complications (to make general observations about the relationship, not infer causality); where misoprostol is sold (e.g., pharmacies or clinics); and average cost per pill by state or region (if available). In some cases, commercial research firms may also collect independent information from physicians regarding prescribing practices, including indications for use. Data on the primary reason for prescribing misoprostol will tell us whether the drug was prescribed for gastrointestinal problems or for obstetric reasons (although in legally restricted settings, physicians are unlikely to explicitly admit to prescribing misoprostol to induce abortion).

How to Conduct a Study Using These Data: An Example from Mexico

Using a real-life example from an unpublished study in Mexico, a country where abortion is legally restricted (except in Mexico City), we outline how pharmacy sales data can be used to answer research questions related to the market share of misoprostol products and trends in sales and prices over time. This information is indicative of the extent to which these products are used for induced abortion and other indications.

In 2007, the Population Council contracted a research firm to assess national- and state-level sales trends in all drugs containing misoprostol over the past five years, as well as trends in price, prescription requirements and drug marketing from 2003 to 2007. The data sources included monthly reports from wholesale distributors; monthly audits of national- and state-level sales; a profile of vendors and providers who received the drugs; and lists of recipients of promotional material for each product. The analysis focused on six products that contained misoprostol (Cytotec and other brand names) at dosages that could be used to induce abortion.

We present preliminary (unpublished) results to illustrate the wealth of information we can gain from pharmacy sales data. Over the past five years and in 2007, Cytotec was the dominant brand by grams sold—though by units sold, each brand has a similar percentage of the market. Earlier data show that while national-level Cytotec sales increased from 1989 to 2000, they declined slightly

from 2000 to 2007. Fifty percent of all Cytotec sales were concentrated in six of the 31 states in the Republic, with Mexico City having the highest sales volume of the drug.

Interestingly, price data suggest that Cytotec sold as bottles of 28 pills doubled in cost from 640 pesos (US$64) in 2003 to 1,232 pesos (US$120) in 2007, but sales did not increase. As of July 2009, the price quoted by a major pharmacy chain was $1,322 pesos per bottle (US$99). Given the devaluation of the peso since the beginning of 2009 (as of this writing in mid-2009, the peso is at 13.3 to the dollar instead of 10.5 in 2007), the price has remained stable over the past two years.

The prescription data revealed that only 3% of Cytotec sales required a prescription, confirming the belief that the drug is easily available over the counter. Moreover, misoprostol sales increased slightly in Mexico City, but not in other states, just after the Legislative Assembly legalized first-trimester abortions in that state in May of 2007. The principle reason for prescribing Cytotec was for abortion, but the main reason for prescribing other misoprostol drugs (i.e., Artrene, Artrenac and Artrotec) was for inflammation and pain relief. Furthermore, obstetrician-gynecologists most often prescribed Cytotec (79%) compared with other drugs containing misoprostol, again suggesting that Cytotec is used almost exclusively for abortion and obstetric complications (e.g., labor induction and postpartum hemorrhage) and not for gastrointestinal problems.

We also requested that the firm review the promotional literature about Cytotec in Mexico dating back to 1998, to assess how it was being marketed. We found virtually no mention of Cytotec's use as an abortifacient, suggesting that word has spread about its off-label use through other channels.

The other products containing misoprostol on the market in Mexico, such as Artrene, Artrenac and Artrotec, are approved (and mainly used) for inflammation and pain relief, since they contain a combination of diclofenac and misoprostol. These drugs have high annual sales volumes and some have increased in sales in the last five years. For example, sales of Artrene, which contains 100 mcg of misoprostol per tablet, increased from 54,000 units in 2003 to around 200,000 units in 2007. Even though some of this increase could be related to use to induce abortion, it is difficult to quantify.

From these sales data, we can make the following preliminary conclusions: Cytotec is the most popular misoprostol product on the Mexican market used to induce abortion and it is sold primarily without a prescription. Although total sales of Cytotec decreased slightly over the past five years, we have no evidence to conclude that its use as an abortifacient is declining as well. On the contrary, the data suggest that there are new ways of packaging and purchasing the product, such as unit sales in pharmacies, herbal markets and over the Internet.

Limitations of National Pharmacy Sales Data

While these data can provide important insight into misoprostol sales, their use has some limitations. National pharmacy sales data usually are not exhaustive or captured in a way that is nationally representative of all misoprostol sales, though some databases are more comprehensive than others. For example, if pharmacy sales data capture sales at the national level only, we cannot generalize to the state or local level. It is important to understand the extent to which this data source can be representative of larger sales trends up-front. In addition, though it is tempting to link trends in misoprostol sales to trends in abortion and related morbidity, we cannot infer any causal relationship between these phenomena (or else we commit "ecological inference fallacy" by not accounting for individual-level confounders). Additionally, we do not know what proportion of misoprostol sales correspond to induced abortions, since some providers or clients can also buy the product for other obstetric indications, such as labor induction or postpartum hemorrhage.

We also do not know what proportion of Cytotec bottles are sold in pharmacies only to be resold as single pills or repackaged in some other way. Evidence based on informal conversations suggests that physicians, obstetrician-gynecologists and clients purchase misoprostol in pharmacies for other indications, such as labor induction, postpartum hemorrhage and incomplete abortion. More research is needed to estimate the proportion of sales used to induce abortion to understand the influence of the drug on abortion incidence. Finally, there are cost and data quality considerations we must explore before trying this method to estimate misoprostol's contribution to abortion incidence. In sum, national pharmacy sales data provide information on only one way abortions are induced in a particular setting, and this information can be incomplete. However, we can use these data to enhance our understanding, formulate new hypotheses and cross-validate other data sources to arrive at more accurate estimates of induced abortion.

Surveys and In-Depth Interviews with Women and Providers

Type of Data and How They Are Obtained

Surveys with women, providers and pharmacists are popular and effective ways to gauge knowledge about misoprostol and its use and complications (Miller et al. 2005; Ganatra et al. 2005; Garcia et al. 2004; Misago et al. 1998; Lisker et al. 2006). The survey format depends on the study objectives and sample population. Such surveys

can follow the format of surveys to assess knowledge, attitudes and practices (or "KAP") or focus specifically on one of those components. They can include closed or open-ended questions (or a combination of the two) and use convenience or random samples at the national, state or local level. Qualitative studies are particularly useful for understanding more complex research questions that we cannot answer with quantitative methods, such as attitudes about misoprostol, experiences using the drug to induce abortion and barriers to access. Because of the sensitive nature of questions on abortion, anonymous or self-administered surveys or the use of indirect questioning (described below) can be feasible alternatives and increase the veracity of self-reporting.

What We Can Infer from These Data About Misoprostol Use

These surveys provide individual-level data on misoprostol knowledge and use. They are essential for understanding the extent to which misoprostol can affect abortion incidence and morbidity. Surveys among women offer a wealth of information on actual use. Key indicators include knowledge about the drug, specifically how and where women obtain it; whether a prescription is needed; and women's levels of knowledge about misoprostol's function, side effects and complications. In addition, we can measure use, specifically, how extensively women (or people they know) use misoprostol, whether they use the correct dosage and whether they experience side effects or complications.

Provider and pharmacist surveys can complement these findings. Specifically, we can measure these professionals' awareness of medication abortion drugs; their knowledge of the correct dosage and administration of misoprostol; their understanding of the drug's side effects and warning signs; their attitudes about the drug as an abortifacient and toward women who use it to induce abortion; how often they prescribe or dispense it as an abortifacient; and how often they dispense it for its licensed health indications (e.g., gastric ulcers).

How to Address Potential Underreporting

Abortion, like intimate partner violence and HIV, is a sensitive and stigmatized topic in many countries. Both women and providers may be hesitant to discuss it during face-to-face interviews. Therefore, we should anticipate some underreporting, especially among women. However, there are ways to overcome this potential obstacle, such as through indirect questioning. Instead of asking very personal questions, such as "have you ever used misoprostol to induce abortion?" it is better to ask more general questions that generate less anxiety, such as "do you know of anyone who has used misoprostol to induce abortion?" or "would you recommend misoprostol to a friend/family member who needs an abortion?"

Investigators have used this approach to survey providers in countries where abortion is legally restricted, such as in Mexico and Brazil (Garcia et al. 2004; Faundes et al. 1996; Costa and Vessey 1993). Although indirect questions do not tell us whether the respondent has ever used misoprostol, we can get a sense of the drug's prevalence in a given sample without making respondents feel uncomfortable or judged. Another drawback of indirect questioning is that respondents may not have much information about their friends' or acquaintances' misoprostol use if the latter groups are hesitant to disclose personal information.

In legally restricted settings, indirect questions also may be appropriate for providers who fear backlash or criminal persecution. Some providers who offer misoprostol to patients who seek an abortion may feel uncomfortable responding to direct questions about their experiences with the drug. To address this problem, we can ask about providers' perceptions of misoprostol use. Researchers have employed this technique with health care providers in surveys that gauged knowledge, perceptions and use of misoprostol in Mexico (Garcia et al. 2004; Juarez et al. 2008; Lara et al. 2007; please see Chapter 9 of this volume).

With indirect questioning, we can ask providers to estimate the prevalence of misoprostol use to induce abortion and its associated complications in their patients and geographic setting; the resulting data can be useful in further calculations of the drug's potential effect on abortion incidence and morbidity. Briefly, as part of an application of the Abortion Incidence Complications Method in Mexico (AICM, Chapter 6), Juarez and colleagues (2008) modified the AICM's usual survey of health professionals who are knowledgeable about abortion to ask providers how frequently women had requested an abortion from them. The questionnaire also asked all health professionals to assess the the proportion of abortions professionals believe to be induced by misoprostol; the proportion of abortions induced with misoprostol that require follow-up treatment in a hospital; the number of years that misoprostol has been used in Mexico to induce abortions; and the most common providers of the drug in Mexico. The investigators then used this self-reported information to estimate the incidence of medication abortion with misoprostol—and then of all induced abortions—in Mexico.

Anonymous, self-administered surveys are another option. Some providers and pharmacists may feel more comfortable answering sensitive questions when they know that confidentiality is assured. Doing so can include assuring providers that responses or study materials can-

not be linked to any individual provider. In addition, some providers may prefer a self-administered questionnaire simply because they can complete it on their own time. The primary limitation of this type of survey is its potential to yield a low response rate and incomplete data.

Although other chapters of this volume discuss anonymous abortion survey techniques in detail, we briefly mention two here. The "sealed envelope technique," developed for a study on abortion incidence in the Philippines, is used when it may not be feasible to ask sensitive questions about women's abortion history through face-to-face interviews (Juarez et al. 2007). Briefly, this technique consists of giving women a separate short survey with the most sensitive questions about abortion, which they fill out anonymously and place in a sealed envelope after completing the larger survey.

The randomized response technique is another indirect survey method to measure highly sensitive and underreported behaviors. For this technique, participants are assigned to one sensitive yes-or-no question or one non-sensitive yes-or-no question with a known probability (such as "what color are your eyes?"). The interviewer does not know which question was asked and only records the participants' response. This technique can be used to estimate the proportion of respondents who answered "yes" to the sensitive question (Lara et al. 2004, Lara et al. 2006a). In fact, investigators who compared four methods of collecting information on induced abortion in Mexico found this technique to be the most accurate (Lara et al. 2004, see Chapter 9) and successfully applied it to a national-level study that estimated induced abortion in Mexico (Lara et al. 2006a).

When indirect questioning is not feasible, we can use a method of direct questioning called the "value-free technique." This method has been shown to increase reporting of abortion in legally restricted settings and is described in greater detail elsewhere (Okonofua et al. 2003). With this method, respondents are asked a series of closed-ended questions about unwanted pregnancy outcomes. If the respondent has had an unwanted pregnancy, she is asked how she resolved it with predetermined response options (e.g., continued the pregnancy, unsuccessfully tried to abort, successfully had an induced abortion, etc.). Women who respond affirmatively to having tried to abort, regardless of outcome, can be asked which method they used to elicit information on possible use of misoprostol or another abortifacient.

Limitations of Surveys with Women and Providers

Face-to-face surveys or the self-administered alternative are invaluable for measuring misoprostol use and for subsequent analysis of the extent of the drug's effect on abortion estimates in legally restricted settings. This approach has the same limitations as any survey, specifically, those resulting from poorly designed questionnaires and from sampling bias. The main limitation with respect to abortion research is underreporting, which we can resolve, in part, through the techniques described here and by combining multiple methodologies. For example, a study conducted in Mexico City combined a survey and mystery client methodology (see next section) to gather information about misoprostol provision practices in a random sample of 97 pharmacies (Lara et al. 2006b). The two methodologies yielded very different results. According to the survey responses, 47% of pharmacy staff reported that they required a prescription to sell misoprostol; the mystery client encounters, however, demonstrated that only 11% required a woman to present a prescription (Lara et al. 2006b).

This method can yield representative, and therefore generalizable, results when a random sample is used. For example, random samples were used in public opinion surveys on abortion conducted in Mexico at the national and city levels as well as in a pharmacy-based study (traditional and chain pharmacies) (Garcia et al. 2004; Wilson et al. 2008, Lara et al. submitted for publication). However, in some legally restricted settings, cost, logistics and uneven access to potential participants may make a convenience sample the more feasible option. Strategies for obtaining representative samples of women, providers and pharmacists should be explored in greater depth. When proceeding with surveys of women and providers on such a sensitive topic, we must be particularly mindful of the study sample, the types of questions asked and how we ask them.

Pharmacy-Based Mystery Client Studies

Type of Data and How They Are Obtained

A relatively new methodology in abortion research is the mystery client scenario, which is used primarily in pharmacy-based studies, though it can be applied to any client-provider interaction (Lara et al. 2006b; Billings et al. 2009; del Paso et al. 2007). The premise of this methodology is that the interviewee (i.e., pharmacy staff, physician, etc.) will give a more truthful response about the sensitive issue of misoprostol if asked by a supposed client instead of an interviewer.

The methodology uses fieldworkers who are trained to pose as clients who fit a specific profile at a sample of pharmacies (e.g., chains, franchises, etc.) in different geographic settings. To assess how pharmacy staff respond in different scenarios, researchers can use a variety of mystery client profiles in a single study, such as teenager, middle-aged married woman or male partner of a woman

seeking medication abortion. The clients explain their preassigned situation and inquire about options for medication abortion. For example, a fictitious client may ask for general information about a drug to terminate pregnancy or explain her situation and see whether the provider spontaneously recommends a specific drug. Both of these assigned situations have been tested and shown to be effective in obtaining information on misoprostol (Billings et al. 2009; Lara et al. submitted for publication).

After their interaction with a provider, the mystery clients record any specific information they received about misoprostol and their qualitative observations/comments on a form designed for this purpose. These data can be qualitative, quantitative or a combination. Mystery clients also are trained to stop the interview at any time a pharmacist becomes suspicious or demonstrates any hostility.

What We Can Infer from These Data about Misoprostol Use

Important indicators we can measure using this data collection approach include misoprostol availability at pharmacies; whether pharmacy staff spontaneously recommend the drug during client encounters; the specific recommended dosage; whether providers inform women about complications and side effects and where to go if a complication occurs; pharmacy staff's willingness to sell the drug; whether a prescription is required; and cost per pill/bottle. In addition, the qualitative observations provide further information about the pharmacy location and setting; the number, type and availability of pharmacy staff; the store's hours of operation, etc. We can also explore how pharmacists' responses vary by client profile, pharmacy type and location, and other factors of interest.

In one noteworthy example of a mystery client study conducted in eight cities in Mexico (Lara et al. submitted for publication), investigators used a simple random sample of 192 pharmacies (24 in each of the eight study cities) from a database of 2,994 registered pharmacies maintained by the Mexican government. They then stratified the sample into 12 independent pharmacies and 12 chain pharmacies per city. The sample was stratified again by socioeconomic level of the area to yield equal representation in low and very low socioeconomic status areas and in middle socioeconomic status areas. Sites with incorrect contact information were removed or substituted.

The investigators sent three types of trained mystery clients to every pharmacy in the sample—a young woman (aged 18–25); a slightly older woman (aged 26–35); and a man posing as the partner of a pregnant woman. A total of 576 mystery client–provider interactions were held. If the vendor did not mention Cytotec spontaneously, the client was trained to ask directly about it. For example, the female mystery clients were trained to say that a friend had recommended the drug and to ask if the provider knew about its availability in the pharmacy and if it works. They were trained to use the following prepared text: *"My menstrual period is two weeks late. My last period was six weeks ago. I had a positive pregnancy test. Could you tell me what drug I could take to induce an abortion?"*

The male mystery client was trained to say that his girlfriend was pregnant and he was requesting the drug for her. Mystery clients solicited information only and stopped short of requesting a prescription or otherwise obtaining the drug. Investigators then conducted bivariate analyses to assess how type of pharmacy, type of client and sex of the provider affected the following outcome variables—the provider's spontaneous offer of Cytotec; the recommendation of Cytotec once the client requested it; the recommendation of an effective dose; requiring that the woman have a prescription to receive Cytotec; and the availability of the drug by individual pill in the pharmacy.

We highlight some important findings here. Only 23% (n=132) of providers spontaneously recommended a drug to induce abortion and among those, 81% (n=107) recommended a drug with abortifacient properties (Lara et al. submitted for publication). Within that group, 75% (n=99) specifically recommended Cytotec. In 67% of the cases where the drug was not spontaneously recommended, the provider nonetheless reported knowing about Cytotec when asked directly by the mystery client. However, among the providers who recommended Cytotec, only 16% (n=66) mentioned an effective misoprostol dose (600 mcg) to induce abortion. The findings suggest that despite the supposedly widespread knowledge about and frequent recommendation of misoprostol to induce abortion in Mexican pharmacies, few pharmacy providers were informed about the drug's correct dose. As one of the first studies to use the mystery client methodology to gather data from a random sample of pharmacies, the study shows how the technique can elicit important information that may otherwise be impossible to obtain through traditional research methods.

Another important study used the mystery client technique in a random sample of independent and chain pharmacies in one state in Mexico (n=177 pharmacies) and three cities in Bolivia (n=100 pharmacies) (del Paso et al. 2007). Trained fictitious clients (all women) visited each pharmacy where they were trained to ask for a medication to induce menstruation and clearly state that they were "pregnant." If the medication was offered, the clients proceeded to ask questions about dosing, side effects and efficacy. If it was not spontaneously offered, the fictitious clients were to indicate that someone had told them that misoprostol might work and to ask the pharmacist/staff member for more information.

Results revealed wide variation in misoprostol availability, knowledge and cost by site and country (del Paso et al. 2007). For example, misoprostol was more widely available in Mexico than in Bolivia, even though it was nearly 10 times as expensive (per pill price of US$4 vs. US$0.69). Moreover, a greater percentage of Mexican than Bolivian pharmacy staff provided information about dosing and side effects. In both countries, approximately 80% of pharmacies offered misoprostol without a prescription (del Paso et al. 2007).

Limitations of Mystery Client Pharmacy-Based Data

The major limitation of the methodology is that mystery clients may be unable to obtain sufficient in-depth information about misoprostol because they can only inquire about the drug, not purchase it. This limitation is justified, however, because otherwise the mystery client would act unethically by intentionally deceiving the pharmacist or provider. Another limitation is the potential recall bias of the mystery clients themselves: Information on dosage, side effects and/or complications is particularly susceptible to recall bias. Since fictitious clients cannot take notes during the provider-client interaction, they may forget some of the information exchanged or include information that was not said (e.g., when fictitious clients mix up specific conversations).

In addition, because mystery client studies are relatively new in abortion research, some ethical review boards and even researchers may raise ethical concerns simply because they are not yet well versed in the methodology. The main ethical question that may arise is around informed consent of the pharmacists, pharmacy staff or physicians being interviewed who unknowingly engage in dialogue with a fictitious client and whose responses are used for research purposes. However, we can allay those concerns by keeping in mind the following three arguments.

First, it would be virtually impossible to get reliable and accurate information from providers about misoprostol using any other method because of the sensitivity and stigma around abortifacients in legally restricted settings. Second, mystery clients solicit information only, not the medication itself; they are not asking the provider to do anything that would put him/her at risk for legal action or censure. In addition, the mystery clients are trained to handle several scenarios and know when to stop the conversation from progressing to the point where they get a prescription or physical exam. Third, all of the data that mystery clients collect are completely anonymous and cannot be linked to any individual provider.

Another related limitation of the methodology is that the information collected can vary and be incomplete, since the data stem from a conversation rather than a formal interview. Among the factors beyond the researchers' control that can influence the accuracy of the data are the providers' knowledge and attitudes about abortion; the time they have available for the conversation; and the clients' ability to act out their scenario, ask the appropriate questions, memorize the information given by the provider and correctly fill out the form. To increase the likelihood that the method yields high quality data, we recommend that intensive training be conducted with mystery clients and that the fieldwork be closely supervised.

Using this technique does not preclude the study from being representative. In fact, both studies we describe used random samples of pharmacies. Because the training and oversight for this technique are expensive, conducting a mystery client study that is representative beyond the city/state level may be prohibitively expensive. On the other hand, since this is a new technique in a research area with significant unknowns, it may be more feasible to simply use a large convenience sample of pharmacies, especially in settings where it is impossible to get accurate data on the number of pharmacies needed to generate a random sample.

Another issue with the representativeness of the sampling method is that mystery clients obtain information from only one on-site provider per pharmacy (rather than from everyone on staff). While conducting more than one client-provider conversation per pharmacy would increase representativeness, it would also significantly increase the study cost and put the anonymity of the fictitious client at risk if she/he visits a single pharmacy multiple times. On balance, to assure the integrity of the method, quality of the data and personal safety of the mystery clients, it is more important to maintain anonymity than to achieve a randomized sample at the individual provider level. Therefore, the recommended approach is to randomize by site, but not within site.

Data from mystery clients, like the data from other sources described in this chapter, help strengthen estimates of abortion incidence and morbidity, which, in turn, are critical for developing effective programs to combat maternal mortality. The technique may allow investigators access to accurate data they otherwise could not get through standard face-to-face or self-administered surveys.

Incorporating Estimates of Misoprostol Use into Estimates of Abortion Incidence

Each method we present in this chapter provides a perspective on misoprostol availability, knowledge or use in legally restricted settings and each approach can be used alone or in combination. To develop a more complete picture of the potential effects of misoprostol use on abortion

incidence and morbidity estimates, whenever possible, complementary studies may be analyzed side by side using data triangulation. For example, in typical incidence studies that indirectly measure the incidence of all abortions by assessing the proportion of the total that hospitalized complications represent, the basis for that proportion, the Health Professionals Survey (HPS) questionnaire, can be modified to include questions about professionals' perceptions of misoprostol use, as was done in a recent study from Mexico (Juarez et al. 2008).

If concurrent data from other studies are available, these data can be compared with and "combined with" data from the modified HPS questionnaire. Data triangulation attempts of this sort have been reported (Lara et al. 2007; and see Chapter 9), but are still conceptually new and as with any modeling exercise, they require many assumptions. For example, investigators used the adapted HPS questionnaire from the Mexico incidence study (Juarez et al. 2008) and complementary information from a mystery client study of misoprostol sales in pharmacies (and state-level misoprostol sales data) to estimate the proportion of induced abortions accounted for by misoprostol self-use, and the proportion of all induced abortions complications attributed to misoprostol (Lara et al. 2007). While still a work in progress, a working paper on preliminary results was presented at a 2007 seminar of the International Union on the Study of Population (IUSSP) and is available on the IUSSP Web site.

Dissemination of Findings in Legally Restricted Settings: Proceed with Caution!

Developing an effective and culturally relevant dissemination strategy about misoprostol use is the final step in abortion incidence research. We must consider our key audiences as well as the cultural, political and legal context surrounding abortion in a given setting. Despite abortion being legally restricted in most countries in Latin America and the Caribbean, misoprostol's off-label use is likely widespread in the region. In these settings, we must proceed with caution when disseminating findings about misoprostol to avoid potential political backlash against the drug and the women who use it. While a cautious approach to disseminating data about misoprostol may seem insufficient at first given the public health problem caused by unsafe abortion, it ultimately can be an effective strategy in mainstreaming medication abortion in legally restricted settings. This section provides points to consider when designing effective dissemination strategies in developing countries, using contrasting examples from Brazil and Nigeria.

The Brazilian government's withdrawal of Cytotec from the market in 1991 after its use as an abortifacient was widely publicized is a telling example of the negative consequences of moving too quickly. The "Cytotec controversy" in Brazil, detailed elsewhere (Costa 1998; Guedes 2000; Coelho et al. 1994; Arilha and Barbosa 1993), illustrates how too much publicity about misoprostol's off-label use can lead to the drug's further restriction and ultimately limit women's options. Induced abortion in Brazil is legal only in cases of rape or to save the pregnant woman's life. Even when legal criteria are met, however, women face significant access barriers, including prolonged judicial process, negative provider attitudes and cost (Costa 1998).

Brazil licensed misoprostol for the treatment of gastric ulcers in 1986 and allowed it to be sold over the counter without a prescription. Not surprisingly, the drug became popular as an abortifacient. As information about the drug spread rapidly through networks of providers, pharmacists and women themselves, so did misoprostol's sales and use. A survey of hospital records conducted in Fortaleza, Northeast Brazil, showed that by 1990, misoprostol had been used in 70% of all hospitalized induced abortion cases, compared with only 12% in 1988 (Costa 1998). The Brazilian press's widespread coverage of this increase sparked a heated debate about the drug. While women's groups and some doctors argued that misoprostol use had helped reduce unsafe abortion and abortion-related maternal mortality, other groups, including some medical professionals, began a campaign against the drug. They demanded the withdrawal of misoprostol from the market because of its widespread off-label use.

By 1991, the Brazilian Ministry of Health bowed to political pressure and issued new regulations in an effort to restrict use of the drug. The regulations limited misoprostol sales to pharmacies only, with the additional requirement that a copy of a doctor's prescription remain on file. Some states banned misoprostol sales entirely. While these restrictions made it somewhat harder for women to buy the drug, they had little effect on its use. Instead, clandestine abortions (both surgical and medication) continued to be common. Black market sales of misoprostol increased as did costs of the drug and the numbers of abortions induced with traditional and potentially harmful methods (e.g., herbs and intentional injury) (Costa 1998). Today, advocates favor incremental change in legislation and health services to overcome ambivalence in the medical profession and improve women's reproductive health options (Guedes 2000).

An effective strategy used in Nigeria, another legally restricted setting, is the promotion of misoprostol to prevent maternal mortality through its use to treat postpartum hemorrhage. Since the Nigerian government is committed to addressing maternal mortality, it has approved

misoprostol for this indication. Public health advocates used this approval as a window of opportunity to raise awareness about the drug and also push for its use for other women's health indications.

We can learn from these cases how best to proceed with evidence-based findings on misoprostol in other countries. Our ultimate goal is to ensure that providers and women have accurate information without provoking new controversy about medication abortion. Clearly, to develop an effective dissemination strategy, it is important to gauge the existing political climate and identify key opinion leaders, as well as the major formal and informal channels of communication. Timing is also critical. In a highly volatile political situation, the smartest strategy may be to share findings with only limited select academic and prochoice women's health providers until a more favorable environment arises. Once it does, we can use evidence from misoprostol studies to build advocacy arguments that serve to consolidate favorable public opinion and encourage reform of policies regulating medication abortion.

Conclusion

While data on women's self-use of misoprostol to induce abortion are challenging to collect, and even to interpret, research on this issue is greatly needed to understand women's experiences with the product as well as the medication's potential impact on abortion incidence and morbidity. Clearly, certain research methodologies are more commonly used than others, and all of the methodologies described above have their limitations. Yet readers should feel heartened that, barring cost constraints, these data are not impossible to collect.

In attempting to quantify the potential impact of widespread misoprostol self-use on abortion incidence and morbidity, more rigorous studies are required and are likely to rely on data triangulation techniques in tandem with incidence studies. Still, we caution the reader that further conceptualization and method-testing is needed to validate the underlying assumptions of triangulation techniques. Once they are verified, triangulation efforts could yield valid estimates of misoprostol-related abortion incidence and complications, which can, in turn, be used to estimate the all-important overall incidence of induced abortion.

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Supplementary Document:

Chapter 3:
Three Approaches to Improving the Use of Face-to-Face Interviews to Measure Abortion

Heidi Bart Johnston, et al.

ABORTION FREQUENCY SURVEY [AFS]
MATLAB, BANGLADESH

Respondent Information:

CID		AFS ID	
RID		Bari name	
		Bari number	

Interviewer visits	1	2	3	Final visit	
Date				Day	
				Month	
				Year	
Interviewer's ID #:				ID #	
Result* (see codes):				Result*	
Next visit: Date:				Total number	
Time:				of visits	

*Result codes:

1 Completed
2 Respondent absent at time of visit
3 Respondent absent for extended period
4 Respondent no longer lives in bari
5 Postponed
6 Refusal by _____ Reason_____
7 Dwelling not found
8 Other _____

READ CONSENT FORM	Yes	No
RESPONDENT GAVE SIGNATURE OR LTI	Yes	No

	Edited by:	Keyed by:	Keyed by:
Name			
Date			

T1. Time interview begins: [ ]

Marriage

First I have some questions about your marriage.

M1. When were you married to your (current) husband? *DD / MM / YY*

(Write 01 at earliest date in calendar respondent married to husband.)

M2. Is this your first marriage? Yes = 01 | No = 02

1. Yes 2. No ▶

M2a. When were you first married?

M2b. How did this marriage end? divorce = 04 | widow = 05

M2c. When did your first marriage end?

(If this marriage ended in past 6 years, ask respondent about times in past 6 years she spent more than 20 days apart from husband. Write answers in box below.)

M3. Now do you live with your (current) husband? Yes = 01 No = 02

1. Yes 2. No ▶

M3a. Why don't you live with your husband?

temporary separation = 02 divorced/deserted = 04 widowed = 05

(Record event in box below at date event occurred if occurred in past 6 years)

M4. Please tell me: over the past 6 years when did you live apart from your husband for about 20 days or more? Maybe you went away for a while, maybe your husband went away for a while.

Sometimes = 01 Never = 02 *(Write dates apart in box below.)*

1. Sometimes ▶
2. Never ▼
(go to "Births" section)

Can you think of any other times in the past 6 years you and your husband were apart?

Sometimes = 01 Never = 02 *(Write dates apart in box below.)*

If you are not sure when you and your husband were apart, please tell me when you think you were apart.

(Probe to find all dates respondent and husband were apart.)

year	***date apart:*** DD/MM - DD/MM	***date apart:*** DD/MM - DD/MM	***date apart:*** DD/MM - DD/MM	*year*
1403				1997
1402				1996
1401				1995
1400				1994
1399				1993
1398				1992
1397				1991

CALENDAR

*Write "**01**" in calendar in column 3 at dates respondent and husband were <u>together and married.</u>*

*Write "**02**" in calendar in column 3 at dates respondent and husband were <u>temporarily apart.</u>*

*Write "**03**" in calendar in column 3 at dates respondent <u>thinks she was apart</u> from her husband.*

*Write "**04**" in calendar in column 3 at date respondent was <u>divorced or deserted</u>*

*Write "**05**" in calendar in column 3 at date respondent <u>widowed</u>.*

M5. What work does your husband do?

M6. Does he live in the house or work elsewhere? home = 1 | elsewhere=2

Birth History

B1. Now I would like to know about your children. How many children do you have? ___

(fill in birth order column with most recent birth first)

B1a. Please tell me about the child born most recently.

(fill in table below with information from most recent birth)

B1b. Please tell me about the child born before (name).

(fill in table below with information from each birth)

B2. Have you ever given birth to a child who later died? | Yes = 01 | No = 02 | ___

1. Yes: → *(fill in table below with information from each birth who later died)*
2. No ↓

B3. Have you ever had a stillbirth? | Yes = 01 | No = 02 | ___

1. Yes: → *(fill in table below with information from each stillbirth)*
2. No → ***GO TO*** *Question B4.*

Birth order and name	*Sex*	*Age*	*date of birth*	*gestation*	*fully bf*	*ppamenorrhea*
	M F					
	M F					
	M F					
	M F					
	M F					
	M F					
	M F					
	M F					
	M F					
	M F					

B: *In column 1 of calendar write "B" to represent each date of birth*

P: *In column 1 of calendar write "P" to represent each month pregnant*

BF: *In column 1 of calendar write "BF" to represent each month of breastfeeding fully*

Am: *In column 1 of calendar write "Am" to represent each month of postpartum amenorrhea*

St: *In column 1 of calendar write "St" to represent each stillbith.*

B4. So, in all, including stillbirths, you have had _____ births in your life. Is that correct? ___

B5. In the past 6 years you have had ____ birth(s). Is this correct? ___

Contraception

C1. Now I'll ask you some questions about a different subject. Have you or your husband ever used or tried any way to delay or avoid becoming pregnant? | Yes = 01 | No = 02 |

1. Yes ↓ 2. No ▶ Probe. If still "No", GO TO: "Pregnancy / Menstruation"

C2. In the past 6 years what methods have you or your husband used or done?

(Complete the box below using the following codes:

(n)	no method	IUD	IUD
(p)	pill	INJ	injection
(c)	condom	FS	female sterilization
(r)	rhythm (safe period)	MS	male sterilization
(w)	withdrawal	NOR	norplant
(o)	other		

(If she stopped using any method, ask:

C3. Why did you stop using this method?

(Complete the box below using the following codes:

(1) Became pregnant while using	(9) Infrequent sex / husband away
(2) Wanted to become pregnant	(10) cost
(3) Husband disapproved	(11) fatalistic
(4) Side effects	(12) Difficult to get pregnant / menopause
(5) Health concerns	(13) Marital dissolution / separation
(6) Access / Availability	(14) Other _____
(7) Wanted more effective method	(15) Don't know
(8) Inconvenient to use	

C4. Have you used or done anything else? Any natural methods? | Yes = 01 | No = 02 |

(Complete the box and continue to probe until informant lists all methods ever used.)

method - code	*date started: DD-MM-YY*	*date stopped: DD-MM-YY*	*reason stopped - code*

CALENDAR

(In contraception column 2 write code for each methods used at dates used.)

(In column 2 write codes for reason for stopping each method at date stopped.)

C5. So in the past 6 years, you have used *(method)* from mm yy to mm yy. Is this correct? And you used *(method)* from mm yy to mm yy? And before that you used *(method)*?

(Continue question until respondent reviews all the methods she and her husband have used in past 6 years.)

Pregnancy / Menstruation

Now I'd like to ask you some questions about pregnancy and menstruation.

P1. How many days usually passed between the start of each menstrual period in the past 6 months?

1 month = 1	Pregnant = 2	Amenorrheaic (not pregnant)=3	Irregular Menstruation= 4	Other = 5	

P2. I have some questions about stopped menstruation. Please remember over the past year all the times wh you have had stopped menstruation that did not result in the birth of a child. When did you experience stopped menstruation in the past year?

Sometimes = 01	Never = 02	

1. Sometimes → *(Probe to find out dates of stopped menstruation. Write dates C213in box below.)*
2. Never ↓

P3. Other than the information you have already given me, have you ever had any stopped menstruation in the past 6 years? Please try hard to answer accurately.

(Complete box below. Probe until informant lists all times menstruation stopped in past 6 years.)

date mens stopped	date mens started	symptoms	reason mens stopped	how mens started	treatment / provider	post-event am or bleeding

CALENDAR

P: *For each stopped menstruation caused by pregnancy, write "P" for dates of stopped menstruation*

I-MR: *If induced MR occurred write "I-MR" in calendar on date menstruation returned*

S-MR: *If spontaneous MR occurred write "S-MR" in calendar on date menstruation returned*

Am: *If amenorrhea not caused by pregnancy, write "Am" in calendar for months amenorrheaic*

M: *If amenorrhea was not caused by a pregnancy write "M" in calendar on date menstruation returned*

Now I have some questions about ideal family size.

P4. How many children do you think a family should have? ____

P5. Sometimes women have enough children, and they feel that if they had more children they would not be able to feed, clothe, or educate them. Sometimes women become pregnant soon after giving birth. A woman may feel that a pregnancy so soon after a birth would endanger her own health and the health of her young child. Please tell me, what should a woman do when she has a pregnancy that she cannot afford or that threatens her health?

_____

_____

_____

Menstrual Regulation / Abortion

MR1. As you know, sometimes a woman does not want more children. She is not prepared for a pregnancy, but she becomes pregnant. Please don't mind, have you ever faced this problem?

Yes = 01	No = 02	
	If NO, GO TO MR1b.	

MR1a. What happened at that time?

Treatment *(Complete box below) = 01*	
No treatment/Kept the pregnancy = 02 GO TO MR1b	

notes on MR

(Probe to find out other times women have treated stopped menstruation, GO TO Calendar Review.

MR1b. Sometimes women are shy and do not talk about stopped menstruation. If you choose to answer questions about stopped menstruation, I urge you to not be shy and to answer honestly. Your honest answers are important for the quality of this survey, and for the quality of the future women's health programs in your community. Please don't be shy, but for any reason, have you ever treated an unwanted pregnancy?

Yes = 01	No = 02	

1. Yes: Thank you for your honest answer.
   MR1b-1. What did you do in this situation? *(If MR, complete box below)*
   (Ask about other MRs she has had. GO TO Calendar Review)
2. No: Thank you for your honest answer. *(GO TO Calendar Review)*

(Complete the box and continue to probe until informant lists all times stopped menstruation was treated to stop a pregnancy in past 6 years)

date menstruation stopped	*treatment / provider 1**	*treatment / provider 2**	*treatment / provider 3**	*date menstruation started*	post-event am or bleeding

*provider codes: 01: self
02: homeo doctor
03: village doctor
04: kobiraj
05: FWV
06: other _____

***I-MR**: If induced MR occurred write "I-MR" in calendar on date menstruation returned*

NOTES on reported induced menstruation (discussion of provider, treatment, results of treatment, post treatment complications)

Calendar Review

You have told me a lot of information. I've been writing your responses on this calendar. Now I want to make sure your history is recorded accurately on this calendar. Can you please help by telling me if this calendar reflects your reproductive history over the past 6 years?

(Review calendar. At any place where induced abortion is suspected, probe informant about induced abortion. Mark in column 4 where you probed for induced abortion.)

MR2. Please don't mind, but in all you have had ____ induced abortions in the past 6 years. Is this correct? ☐

Z1. Please tell me your age. ☐

Z2. Please tell me the Bengali month and year in which you were born. _____

Z3. Record the main material of the roof.

bamboo/thatch = 01	tin = 02	cement = 03	other = 04	☐

Z4. Record the main material of the walls.

bamboo/thatch/mud=01	wood = 02	tin = 03	brick/cement = 04	other = 05	☐

Z5. Record the main material of the floor.

earth = 01	wood = 02	cement = 03	other = 04	☐

Thank you very much for your honesty, your time, and your participation in this survey.

T2. Time interview completed ☐

Interviewer Comments:

_____

_____

_____

_____

_____

_____

Do you think the respondent was honest about her MR experience?	yes = 01	no = 02	☐

ABORTION FREQUENCY SURVEY [AFS] **AFS ID**
MATLAB, BANGLADESH **CID**
Instructions: **RID**

For columns 1, 2 and 3 all months should be filled in

Information to be coded for each column

Col. 1: Birth, Pregnancy and Menstruation history

B Births
P Pregnancy
Am Amenorrheic
I Irregular menstruation
M Regular menstruation
BF Breastfeeding
H Heavy bleeding
I-MR Induced miscarriage
S-MR Spontaneous miscarriage
St Stillbirth
D D & C

Col. 2a: Contraceptive use

(n)	no method
(p)	pill
(c)	condom
(r)	rhythm (safe period)
(w)	withdrawal
(o)	other
IUD	IUD
INJ	injection
FS	female sterilization
MS	male sterilization
NOR	norplant

Column 2b: Discontinuation of Contraceptive use

1 Became pregnant while using
2 Wanted to become pregnant
3 Husband disapproved
4 Side effects
5 Health concerns
6 Access / Availability
7 Wanted more effective method
8 Inconvenient to use
9 Infrequent sex / husband away
10 cost
11 fatalistic
12 Difficult to get pregnant / menopause
13 Marital dissolution / separation
14 Other _____
15 Don't know

Col 3. Marriage

01 Married, husband lives with wife
02 Married, huband lives elsewhere
03 Not sure, lived together or apart
04 Separated or Divorced
05 Widowed

Event	Year	Month #	Month name	code #	1 menstruation	2 contra	3 husbd	4 abortn	Month name	Month #	Year
	1404	3	Ashar 1	78					June.15	6	97
Cyclone in Chittagong		2	Jaistha 1	77					May.15	5	97
Eid ul Azha	1404	1	Baishak 1	76					April.15	4	97
	1403	12	Choitra 1	75					March.15	3	97
Eid ul Fitar		11	Falgun 1	73					Feb.15	2	97
		10	Magh 1	72					Jan.15	1	1997
Shab-E-Barat		9	Poush 1	71					Dec.15	12	1996
		8	Agrahayan 1	70					Nov.15	11	96
		7	Kartik 1	69					Oct.15	10	96
Durga Puja		6	Ashwin 1	68					Sept.15	9	96
Jonmastomy		5	Badhra 1	67					Aug.15	8	96
Eid- E- Miladunnabi		4	Sraban 1	66					July.15	7	96
Hasina elected		3	Ashar 1	65					June.15	6	96
Maharram		2	Jaistha 1	64					May.15	5	96
Eid ul Azha	1403	1	Baishak 1	63					April.15	4	96
	1402	12	Choitra 1	62					March.15	3	96
Eid ul Fitar		11	Falgun 1	61					Feb.15	2	96
Shab-E-Barat		10	Magh 1	60					Jan.15	1	1996
		9	Poush 1	59					Dec.15	12	1995
		8	Agrahayan 1	58					Nov.15	11	95
Durga Puja		7	Kartik 1	57					Oct.15	10	95
		6	Ashwin 1	56					Sept.15	9	95
Eid- E- Miladunnabi		5	Badhra 1	55					Aug.15	8	95
		4	Sraban 1	54					July.15	7	95
Maharram/Ashura		3	Ashar 1	53					June.15	6	95
Eid ul Azha		2	Jaistha 1	52					May.15	5	95
	1402	1	Baishak 1	51					April.15	4	95
Eid ul Fitar	1401	12	Choitra 1	50					March.15	3	95
Shab-E-Qudar		11	Falgun 1	49					Feb.15	2	95
Shab-E-Barat		10	Magh 1	48					Jan.15	1	1995
Bijoydibosh		9	Poush 1	47					Dec.15	12	1994
		8	Agrahayan 1	46					Nov.15	11	94
		7	Kartik 1	45					Oct.15	10	94
Durga Puja		6	Ashwin 1	44					Sept.15	9	94
Eid- E- Miladunnabi		5	Badhra 1	43					Aug.15	8	94
		4	Sraban 1	42					July.15	7	94
Maharram		3	Ashar 1	41					June.15	6	94
Eid ul Azha		2	Jaistha 1	40					May.15	5	94
	1401	1	Baishak 1	39					April.15	4	94

Event	Year	Month #	Month name		1 menstruation	2 contra	3 husbd	4 abortn	Month name	Month #	Year
Eid ul Fitar	1400	12	Choitra 1	38					March.15	3	94
		11	Falgun 1	37					Feb.15	2	94
Shab-E-Barat		10	Magh 1	36					Jan.15	1	1994
		9	Poush 1	35					Dec.15	12	1993
		8	Agrahayan 1	34					Nov.15	11	93
Durga Puja		7	Kartik 1	33					Oct.15	10	93
		6	Ashwin 1	32					Sept.15	9	93
		5	Badhra 1	31					Aug.15	8	93
		4	Sraban 1	30					July.15	7	93
Eid ul Azha		3	Ashar 1	29					June.15	6	93
		2	Jaistha 1	28					May.15	5	93
	1400	1	Baishak 1	27					April.15	4	93
Eid ul Fitar	1399	12	Choitra 1	26					March.15	3	93
Shab-E-Barat		11	Falgun 1	25					Feb.15	2	93
Shab-E-Meraj		10	Magh 1	24					Jan.15	1	1993
		9	Poush 1	23					Dec.15	12	1992
		8	Agrahayan 1	22					Nov.15	11	92
Durga Puja		7	Kartik 1	21					Oct.15	10	92
Eid- E- Miladunnabi		6	Ashwin 1	20					Sept.15	9	92
		5	Badhra 1	19					Aug.15	8	92
Maharram		4	Sraban 1	18					July.15	7	92
Eid ul Azha		3	Ashar 1	17					June.15	6	92
		2	Jaistha 1	16					May.15	5	92
Eid ul Fitar	1399	1	Baishak 1	15					April.15	4	92
	1398	12	Choitra 1	14					March.15	3	92
Shab-E-Barat		11	Falgun 1	13					Feb.15	2	92
		10	Magh 1	12					Jan.15	1	1992
		9	Poush 1	11					Dec.15	12	1991
		8	Agrahayan 1	10					Nov.15	11	91
		7	Kartik 1	9					Oct.15	10	91
Durga Puja		6	Ashwin 1	8					Sept.15	9	91
		5	Badhra 1	7					Aug.15	8	91
Maharram		4	Sraban 1	6					July.15	7	91
Eid ul Azha/elections -		3	Ashar 1	5					June.15	6	91
	1398	2	Jaistha 1	4					May.15	5	91
Cyclone / Eid ul Fitar		1	Baishak 1	3					April.15	4	91
Shab-E-Barat	1397	12	Choitra 1	2					March.15	3	91
K. Zia elected		11	Falgun 1	1					Feb.15	2	1991