Contraceptive Sterilization: Global Issues and Trends

ENGENDERHEALTH

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Preface

The publication in 1985 of *Voluntary Sterilization: An International Fact Book*, by John Ross, Sawon Hong, and Douglas Huber, was a landmark event: Never before had such a broad range of important information on the worldwide practice of contraceptive sterilization been gathered in one source. That volume was for many years an irreplaceable resource for researchers, clinicians, and public health figures when they needed essential facts about sterilization.

As time passed, however, the world described in the fact book changed. Surveys collected new data about women's and men's contraceptive behavior. The spread of HIV and other sexually transmitted infections affected both contraceptive practices and service priorities. And the Cairo Programme of Action brought about new perspectives on the provision of reproductive health services. All of these changes led us, a few years ago, to decide that a new version of the fact book was needed. We knew before we even began that a great deal of hard work was ahead; this volume is the product of that effort.

A large number of individuals contributed to the writing of this book; all were with EngenderHealth when the book was written, unless otherwise noted. Evelyn Landry oversaw the development of the entire book, with the invaluable assistance of Ines Escandon throughout the project. Evelyn Landry wrote Chapter 1, with the assistance of Karen Beattie and Georgeanne Kumar. Chapter 2 was written by Carol Camlin and Ines Escandon. Lyn Nguyen Henderson (consultant) and Ines Escandon wrote Chapter 3, and Reed Boland (Harvard School of Public Health) wrote Chapter 4. Chapter 5 was written by Ines Escandon and Shailaja Maru (consultant), and Jean Ahlborg, Carmela Cordero, Vanessa Cullins, Martha Jacob, and Kelly O'Hanley collaborated on the writing of Chapter 6. Mark Barone wrote Chapter 7; Carol Camlin, Lyn Nguyen Henderson, and Evelyn Landry together wrote Chapter 8.

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Evelyn Landry, for the writing team

Executive Summary

Why a Book on Contraceptive Sterilization?

Contraceptive sterilization is one of the oldest modern methods of fertility control, dating to the 19th century. Yet, as we advance into the 21st century, contraceptive sterilization (hereafter referred to as sterilization) continues to warrant considerable attention and study by those involved in the field of family planning and reproductive health care. Why? The answer is simple: Despite the development and introduction of many new contraceptive methods over the last 15 years, sterilization is the most widely used method in the world, in developing and developed countries alike.

Couples and individuals around the world choose sterilization because they want to limit or end childbearing, rather than space future births. For some women, reversible methods are unavailable or inconvenient; for others, contraceptive use may begin only after they have achieved or surpassed their desired fertility. For many, then, sterilization is their first method. The method requires no action on the part of the user beyond election of the initial surgical procedure. It produces a minimum of side effects, while generally offering a lifetime of contraceptive protection. Moreover, female sterilization requires no ongoing cooperation by the sexual partner or spouse, thereby representing a contraceptive option for women who may be powerless to ensure such cooperation. Thus, quality sterilization services will always be a crucial component of any comprehensive family planning service.

As we move into the 21st century, however, two key challenges have emerged for those working to ensure access to quality family planning services. First, over the past 10 years it has become clear that family planning does not stand in a vacuum. Near the close of the 20th century, the international community reached consensus on a broader approach for supporting sustainable development, health, and equity, one that was fully articulated in the Programme of Action of the International Conference on Population and Development, held in Cairo in 1994. The Programme of Action reflected a shift from a focus on population stabilization to a focus on the rights and needs of people, especially women. Realization of this broader approach requires that family planning be fully integrated with comprehensive sexual and reproductive health services. However, adaptation to this new paradigm requires resources, skills, and a policy mandate, all of which remain insufficient in many national contexts. The result is that the paradigm shift called for in Cairo has yet to be fully achieved.

The second challenge is that the world confronts a public health threat like none before, with AIDS having already devastated Africa and now on the threshold of wreaking similar havoc in China, India, Russia, and many other countries. Other sexually transmitted infections (STIs) long neglected in service-delivery settings now appear to increase the likelihood of HIV transmission. Yet sterilization, like all other modern methods of contraception other than the condom, affords users no protection from HIV or other STIs. Thus, programs must intensify efforts to promote barrier methods because of the dual protection they afford and must determine how best to meet the noncontraceptive reproductive health needs of sterilization users.

Regardless of how these challenges are met, safe and effective means of limiting family size will always be needed. For couples who do not want more children, sterilization will continue to be a vital and relevant option. Furthermore, the contraceptive decision making and the social realities that underlie the fact of sterilization's high prevalence are likely to remain largely unaltered for years to come. Thus, it is imperative that we continue to closely study developments in sterilization technology, policy, service delivery, and usage. This is the knowledge base upon which the consensus for change is

built and upon which assurances of access, safety, and protection of individual rights in existing services lie.

Voluntary Sterilization: A Snapshot of Developments

In 1985, EngenderHealth (then the Association for Voluntary Sterilization) published *Voluntary Sterilization: An International Fact Book,* written by John Ross, Sawon Hong, and Douglas Huber. That was the first source book on sterilization ever to have been published, bringing together the results of clinical studies and social science research to provide a comprehensive overview of the practice of contraceptive sterilization worldwide. This book, the successor to the 1985 volume, is intended to serve as an album depicting the state of contraceptive sterilization as the 21st century began. The following are some of the highlights from this effort.

Delivering quality services

Among the many factors that affect the quality with which contraceptive sterilization services are delivered, three require special attention: actual service-delivery modalities, fees and compensation programs, and the cost of service provision. For instance, while sterilization services are provided in an inherently medical context, men's and women's access can be broadened if services are offered during the postpartum period, through mobile outreach, or in male-only clinics (for vasectomy). Likewise, while fees and compensation for providers have led to concern over the potential for coercing clients into accepting sterilization, there is little evidence that such approaches have promoted reliance on this method (see Chapter 1).

The provision of quality sterilization services hinges on the client's ability to make a well-informed, voluntary decision (informed choice), his or her authorization to proceed with the surgical procedure (informed consent), and the client's participation in true two-way communication with a health care worker about the risks and benefits of the procedure (counseling). In helping a client make an informed decision, providers need to assess the client's needs, offer appropriate method options, fill in knowledge gaps, help the client make his or her own choice, and encourage utilization of other appropriate reproductive health services.

The spread of HIV and other STIs across the globe since 1985 has important implications for women and men considering or already using sterilization. Like most contraceptive methods, sterilization fails to offer any protection against STIs, including HIV. Thus, it is imperative for family planning providers to ensure that men and women seeking to use sterilization understand safer-sex practices and how to protect themselves and their partners from these diseases (see Chapter 1).

Incidence and prevalence

Reliance on both male and female sterilization has grown substantially since 1980, when 99 million couples were estimated to be using sterilization; by 1995, this number had climbed to about 223 million couples—180 million women using female sterilization and 43 million men using vasectomy. The number of female sterilization users in 1995 was 42 million higher than 1990 estimates; in contrast, in 1995, the number of vasectomy users was only 1 million more than 1991 levels (see Chapter 2).

Use of female sterilization services seems to have increased in regions where it had been low, particularly in Sub-Saharan Africa. Thus, in nations such as Botswana, Cape Verde, Kenya, Mauritius, Namibia, South Africa, and Swaziland, sterilization prevalence rates are now 5% or higher. The introduction of minilaparotomy services into family planning programs in Sub-Saharan Africa may account for some of this increase in use.

Who uses female sterilization?

Since only individuals and couples who want no more children elect to be sterilized, it is not surprising that sterilization is more common among older women. Nevertheless, the prevalence of female sterilization and the age at which women obtain a sterilization are inversely related: In countries where prevalence is high, the median age is generally low, while in low-prevalence countries, women often are not sterilized until older ages (Chapter 3).

In high-prevalence regions such as Asia and Latin America and the Caribbean, half of sterilized women have 3–4 children. Yet overall, the number of births among sterilized women ranges from a median of two or fewer in China and the United States to five or more in Africa. In Asia and Sub-Saharan Africa, most sterilization users reside in rural areas, while in North America, North Africa, and Latin America and the Caribbean, the majority of users live in urban locales.

Sterilization procedures performed at some time unrelated to a pregnancy (known as interval sterilizations) are more common than postpartum sterilizations in many countries located in North Africa, Sub-Saharan Africa, and South Asia. In contrast, postpartum sterilizations are more common in some countries in Latin America and the Caribbean. Regardless of when a sterilization is performed, though, for many women it is their first experience with modern contraception: It is often the case that more than 50% of women using female sterilization have never used a modern contraceptive method before having the sterilization procedure done.

Legal and policy issues

National laws and policies governing sterilization provision have been liberalized or made clearer in a number of nations. As of 2001, 74 countries had laws explicitly permitting voluntary sterilization for contraceptive purposes, while in 55 the legal situation was unclear. In just eight countries, access to sterilization was restricted by law (either explicitly or by interpretation) except for therapeutic, medical, or eugenic reasons in 2001, far fewer than the 28 countries with such restrictions in 1985 (see Chapter 4).

Yet a number of nations qualify the ability of some groups (most often women) to choose sterilization. Twenty-five countries require a spouse, parent or guardian, physician, or medical committee to grant their consent before at least some sterilization procedures are performed. Moreover, 24 countries have age or parity requirements that must be met prior to sterilization.

What makes people choose sterilization?

The prevalence of contraceptive sterilization varies among different social groups, yet socioeconomic status generally does not appear to be associated with the decision to choose sterilization. Nevertheless, the likelihood of sterilization is greater among couples of lower socioeconomic status in countries such as Bangladesh and India, while higher socioeconomic status is associated with a greater likelihood of sterilization use in Latin America and the Caribbean (Chapter 5).

Users of sterilization frequently say that they chose the method for economic reasons or because they had all of the children they wanted. But other factors also clearly play a role. In particular, friends, relatives, other sterilization users, and health care workers can be important influences on the decision. Misconceptions and misinformation may either encourage or discourage individuals from choosing sterilization. Likewise, gender issues, cultural issues, and degree of empowerment affect the decision making of women and men. Power dynamics within couples appear to play an especially strong role in the choice of sterilization and the type of permanent method selected.

Informed choice and lack of coercion are key factors in ensuring that sterilization clients are satisfied with the method. Regret over being sterilized is generally low among users, but rates vary by region, from around 7% in Colombia and the United States to

about 17% in Bangladesh and the Dominican Republic. Risk factors for regret can generally be divided into three categories: client characteristics (such as age at sterilization and marital stability), circumstances at the time of sterilization, and changes in clients' characteristics or circumstances after the procedure is done.

Female sterilization

Even though tubal sterilization usually involves abdominal surgery, it is one of the safest operative procedures: Complications are rare and occur in fewer than 1% of all female sterilization procedures. Moreover, the likelihood of failure is very low, at less than 2% even 10 years after surgery (see Chapter 6).

There are two broad elements in the performance of female sterilization: the means of reaching the fallopian tubes, and the methods used to occlude the tubes. The selection of a procedure is determined by such factors as the timing of sterilization in relationship to pregnancy; the need for other gynecological procedures; the woman's health; the provider's training, expertise, and experience; the cost and logistics of maintaining equipment; and the availability of back-up services.

Female sterilization results in few long-term side effects. The overall risk of ectopic pregnancy is low (although if a pregnancy occurs, the probability that it will be ectopic is high). Perceived alterations in women's menstrual flow, length, or pain following tubal sterilization (referred to as poststerilization syndrome) have been debated and studied, but research carried out in the United States has shown no strong evidence for the existence of such a syndrome (see Chapter 6).

Male sterilization

The situation with male sterilization is similar to that of female sterilization: Vasectomy is one of the safest and most effective contraceptive methods, with very low complication rates (especially with no-scalpel vasectomy) and failure rates generally thought to be in the range of 2–4 per 1,000 (see Chapter 7).

While potential physiological effects and long-term sequelae of vasectomy have been studied extensively over the past few decades, research has offered reassurance that this method has no serious long-term negative effects on men's physical or mental health. There is little evidence for a causal association between prostate cancer and vasectomy, and a panel of experts convened by the U.S. National Institute of Health in 1993 concluded that no change was necessary in the practice of vasectomy.

No-scalpel vasectomy, which requires local anesthesia and only a small incision, has helped to revitalize vasectomy provision in many countries (Colombia, Mexico, Thailand, and the United States among them), and was the impetus for introducing vasectomy services in others (such as Kenya and Turkey). However, experimental nonsurgical methods of occluding the vas are unlikely to become available in the near future, as a result of questions not only about their efficacy, but also about their ability to be offered in low-resource settings.

Future trends in sterilization usage

Projections suggest that sterilization reliance will increase substantially through 2015, especially in areas of Latin America and the Caribbean and in Sub-Saharan Africa (see Chapter 8). In Asia, by contrast, the prevalence of sterilization is likely to decline as reversible methods become more widely available, particularly in countries (such as China, India, and South Korea) where sterilization usage is currently greatest.

Countries where sterilization prevalence is moderate, such as Bangladesh and Pakistan, will see more modest declines to 2015. Method prevalence is also expected to rise modestly in Vietnam and more dramatically in the Philippines between 2000 and 2015, however, and Indonesia can anticipate a slight rise in prevalence as well.

Potential users of sterilization (defined as fecund women who are in union, want no more children, are not using a contraceptive method, and report that they are considering sterilization as their preferred method) have characteristics similar to women already using sterilization: About half are age 30 or older, their mean number of children and educational level vary widely by country, and they are more often rural residents.

Overall, sterilization prevalence over the next 15–20 years is not likely to differ dramatically from levels seen at the beginning of the century, although the numbers of sterilization users may increase simply as a factor of population growth. Future levels of reliance on contraceptive sterilization in any particular country may vary as a result of unpredictable factors, however, such as changes in sterilization's legal status, the development of new contraceptive methods, or shifts in economic circumstances affecting family planning programs. Continued monitoring of these factors, as well as of societal attitudes toward sterilization and fertility regulation, will be crucial to understanding and anticipating demand for contraceptive sterilization services in both developed and developing countries.

Contraceptive Sterilization: Errata Sheet

Page 21, Table 2.1:

Five-year incidence levels for Nepal should be 1.0 for female sterilization and 0.4 for male sterilization.

Page 53, Supplement 2.3:

Incidence data on female sterilization for Nepal should be:

	5	4	3	2	1	5-year average
Nepal, 1996	0.7	0.7	1.1	1.2	1.4	1.0

Page 54, Supplement 2.4:

Incidence data on male sterilization for Nepal should be:

	5	4	3	2	1	5-year average
Nepal, 1996	0.3	0.4	0.4	0.4	0.5	0.4

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Chapter 1

Delivering Quality Sterilization Services in the Post-Cairo Era

Highlights:

- Contraceptive sterilization is inherently a medical service, but women's and men's access can be broadened through offering services during the postpartum period, through mobile outreach, or in male-only clinics (for vasectomy).
- While the use of fees and compensation for providers in sterilization programs has led to concern over the potential for coercing clients into accepting sterilization, few programs engage in such activities, and there is little evidence that such approaches have promoted reliance on sterilization.
- With sterilization, even more than for reversible contraceptive methods, critical issues are the client's ability to make a well-informed, voluntary decision (informed choice), his or her authorization to proceed with the surgical procedure (informed consent), and his or her participation in true two-way communication with a health care worker about the risks and benefits of the procedure (counseling).
- In helping clients make an informed decision, providers need to assess the client's needs, offer appropriate method options, fill in gaps in the client's knowledge, help the client make his or her own choice, ensure that the client knows how to use the method, and encourage the client to use other appropriate reproductive health services.
- Once a client has been sterilized, he or she continues to have reproductive health needs, and providers should make strong efforts to promote such services as screening for cancer and sexually transmitted infections and adoption of condom use.

In the early years of family planning programs, especially in the developing world, sterilization services often were introduced and provided in a vertical manner—i.e., they were offered in separate facilities, were promoted to the exclusion of other methods, and were not always integrated into the country's health structure. Such approaches were simplistic, rarely addressed the multiple needs and health concerns of the client, and left providers of sterilization services isolated from other health services. Health care providers in these programs rarely had connections with other reproductive health services; they were trained in surgical sterilization techniques, but lacked other important skills and knowledge. Clients were often treated only in relation to their needs as sterilization patients; other health concerns were marginalized (Bakamjian & Harper, 1997). Over time, as family planning services in general gained acceptance, family planning programs integrated sterilization services with other contraceptive and reproductive health services.

Among the hallmarks of the International Conference on Population and Development (ICPD) in 1994 and the Fourth World Conference on Women in 1995 (UN, 1994; UN, 1996) were resolutions emphasizing the need to integrate family planning with other reproductive health services, growing out of an awareness that an individual's needs are multidimensional. To improve the reproductive health of women and men, a range of services must be available and supported by trained staff and by effective, functioning support systems.

The purpose of this chapter is to describe some of the factors essential to the delivery of quality sterilization services.

Provision of Quality Sterilization Services

Sterilization services may be available from a legal or policy perspective, yet access to these services may be limited physically (by the client's distance from a provider and the time needed to access services), economically (by prohibitive service fees, transportation costs, or opportunity costs), cognitively (by a lack of knowledge of contraceptive methods), administratively (by rules and regulations that inhibit choice), and psychosocially (because of cultural, familial, or gender-based traditions or practices). (These issues are discussed in more detail in Chapters 2 and 4.) Because sterilization is a surgical and provider-dependent method and is intended to be permanent, the ability to deliver quality sterilization services depends on voluntary decision making, client-centered counseling, good infection prevention, clinical safety, standards and guidelines for care, appropriate pain relief, and appropriate follow-up care—all of which may be more difficult to provide in low-resource settings. These are many of the same factors necessary for providing an array of family planning methods.

Quality health services are achieved by meeting or exceeding the needs and desires of clients with a minimum of effort, repeated effort, and waste (Berwick, Godfrey, & Roessner, 1990).[1] The successful provision of quality family planning services considers the political, social, and economic environment and systems in which those services are provided. In addition, to maximize the potential of individual contraceptive methods (in this case, sterilization), program managers must take into account and address client and service-delivery characteristics that may facilitate or constrain successful use of those methods (Simmons et al., 1997).

Table 1.1 summarizes some key supply and demand factors that affect quality service delivery and need to be addressed in the provision of sterilization services. These issues are critical to ensuring informed choice for any contraceptive method and are especially important in delivering a permanent method of contraception. (Medical technology factors related to female and male sterilization are addressed in Chapters 6 and 7, respectively.)

Supply Factors

The World Health Organization (WHO) guidelines for female sterilization and vasectomy—*Female Sterilization: A Guide to Provision of Services* (WHO, 1992) and *Technical and Managerial Guidelines for Vasectomy Services* (WHO, 1988)—are excellent resources that describe the essential elements required for establishing quality sterilization services, as outlined in Table 1.1. These guidelines are designed to help managers and service providers organize and maintain quality sterilization services.[2] Highlighted below are just a few key issues that managers and service providers need to consider when designing sterilization programs: service-delivery modalities, fees and compensation programs, and the cost of providing services in the era of health-sector reform.

Service-delivery modalities

Sterilization is a surgical procedure, so there are limitations as to where, how, and by whom it can be provided. Although female and male sterilization are surgical procedures, both are relatively simple and do not require fully equipped hospitals. Because of the simple nature of female sterilization, it is possible to offer services closer to the com-

[1] This definition implies that services are provided in a manner consistent with technical standards.

[2] The two WHO publications provide more information about how sterilization services can be set up and managed. These books specifically discuss the following supply factors shown in Table 1.1: program management and leadership; financial management; service-delivery modalities; equipment, supplies, and logistics; training systems; and monitoring and evaluation.

Table 1.1. Supply and demand factors affecting the delivery of quality services

Supply factors	Demand factors
• Laws, policies, standards, and guidelines • Program management and leadership • Financial management (including cost-sharing or user fees) • Service-delivery modalities (static vs. mobile, vertical vs. integrated) • Surgical techniques (male or female, interval or postpartum) • Equipment, supplies, and logistics • Training systems • Supervision systems • Medical quality-assurance procedures • Sector involvement (public, nongovernmental organization, or private) • Payments and incentives to providers • Information, communications (mass media and outreach), and counseling • Monitoring and evaluation	• Client decision making (assuring informed choice, including informed consent; counseling) • Sociocultural and gender influences • Community influences • Policy and program factors (payments and incentives to clients) • Service-delivery factors (addressing the reproductive intentions and needs of different population groups, communication activities, client-provider interactions)

munity than might be expected. Basic facilities for both female and male sterilization should include a waiting or reception area, an examination area, access to laboratory services, a clean surgical area isolated from the outside and from clinic traffic, and a recovery area (WHO, 1988; WHO, 1992). Most female sterilization services are provided in permanent service-delivery sites (tertiary, regional, or district hospitals, or family planning clinics having simple operating theaters). Vasectomy is even simpler than female sterilization and can therefore be offered in a wider variety of settings, such as treatment rooms in family planning clinics or private physicians' offices (WHO, 1988).

Postpartum services

Providing general postpartum family planning services involves integrating family planning into a site's existing maternity services. Because postpartum programs rely on existing staff and facilities, the costs of establishing such services may be lower than for other means of service provision (Ross & Frankenberg, 1993). Nevertheless, integrating postpartum programs also requires intensive coordination among different departments at a site, which may be difficult to achieve (Church & Geller, 1990; Ross & Frankenberg, 1993). Postpartum minilaparotomy is a safe and effective procedure that does not increase hospitalization time and that allows women access to female sterilization during their delivery hospitalization (Chi, Gates, & Thapa, 1992; WHO, 1982; WHO, 1992).

Postpartum sterilization is usually performed in hospital facilities by obstetrician-gynecologists, though in some instances it has been provided by nurse-midwives and other paramedical staff (Chi & Thapa, 1993). In general, the provision of any sterilization procedure (whether postpartum or interval) requires not only experienced personnel to perform the procedure, but also well-trained staff to offer counseling, preferably during the antenatal period.

Mobile services

Though sterilization services are generally available only at permanent service-delivery sites, in some countries mobile surgical teams are deployed to provide services on a pe-

riodic or seasonal basis. Use of mobile teams allows a program to offer sterilization to clients who live a great distance from static facilities, to maximize the use of trained providers (who may be in short supply), and to respond to demand for sterilization services during selected months of the year, especially during the postharvest winter months. Mobile teams can be expensive to operate, require extraordinary care and special systems to maintain quality, need skillful providers to manage possible complications, require special follow-up, and can be challenging to manage (Jezowski & Hollerbach, 1991). It is best if mobile-team services are provided to communities as a temporary stopgap arrangement and in the context of developing and implementing an action plan for establishing routine services.

Mobile teams can be deployed in two ways. First, a team of trained providers can be sent to existing health facilities that meet national standards but that do not have trained staff. Alternatively, teams can be deployed to perform procedures either at inadequate health facilities or at facilities normally used for other purposes (such as schools or office buildings). The former approach is acceptable, while the latter is extremely difficult to organize and manage and requires special efforts to provide services that comply with standards.

Sometimes mobile services are referred to as "camps." This type of mobile service can be problematic, and in some countries the term is misleading. In the early days of family planning programs in some countries (e.g., Bangladesh, China, India, and Thailand), camps frequently were massive promotional events, with hundreds and even thousands of sterilizations being performed over a short period, often in schools or tents (Begum et al., 2000; Ross, Hong, & Huber, 1985).

In the 1970s, mobile teams were used in many parts of Asia (such as India, the Republic of Korea, Nepal, and Sri Lanka) and in a few countries in Latin America (e.g., Colombia) (Ross et al., 1985). Thirty years later, both India and Nepal still rely on mobile teams as part of their basic family planning program, because the health care infrastructure is weak or because geographic access for many potential clients is difficult, and because of a high demand for sterilization during the winter months. In northern India and Nepal, where the agricultural cycle dominates life plans and activities, the months of November to February represent a postharvest period with adequate stocks of food, relative leisure time, dry weather in which travel is easier, and cooler weather with less dust and perspiration (and a resulting belief that a wound is less likely to become infected). Beginning in 1999, in the state of Uttar Pradesh in northern India, sterilization camps have been broadened to cover basic reproductive health services (Spaid, 2001).

Mobile outreach for family planning is still needed in Nepal. Such services, which are usually offered in rural and remote areas and at temporary facilities, reach a large number of clients. At present, most sterilization services in Nepal are provided through mobile outreach teams on a seasonal schedule, predominantly between November and February. (While services are available throughout the year at selected static clinics, they are used at a much lower rate than during this period.)

Providing services at temporary facilities may create a range of conditions that can lower the quality of care. Medical monitoring reports from supervision teams indicate that some problems encountered at mobile service sites in Nepal include poor sanitation, poor infection prevention practices, crowding, a lack of privacy and counseling, long travel and waiting times, an inability to conduct follow-up care, and a stressful working environment for providers. To address these quality issues, the Family Health Division of the Ministry of Health, Nepal, in collaboration with EngenderHealth (Stanley et al., 2001), developed guidelines for mobile voluntary sterilization services, supported regional workshops where district health officers and family planning assistants worked together to develop an annual plan for mobile outreach services, and strengthened family planning assistants' ability to manage family planning services by participating in orientation sessions and planning meetings.

As noted above, providing mobile services takes careful planning and follow-up. After Peru legalized sterilization services in 1995, the government family planning program decided to increase access to services by conducting mobile outreach services in

rural areas of the country. However, since the government had little experience in providing services on a large scale, inadequately trained providers were dispatched to rural areas as mobile teams to provide services. Besides having staffing problems, the teams lacked the appropriate equipment for providing quality services. These factors compromised service quality, leaving clients without follow-up care postsurgery. In 1998, after receiving public criticism of the poor quality of services, the government took steps to improve quality by strengthening counseling services and by certifying physicians and facilities for surgery (Coe, 2001).

Male-only clinics for vasectomy services

Some countries have experimented with providing vasectomy services in male-only clinics that also offer broader men's reproductive health services (Liskin, Benoit, & Blackburn, 1992; Wegner et al., 1998). In the late 1980s, in an evaluation of their experience in the design of separate male-only clinics or hours for vasectomy services, PROFAMILIA of Colombia found that while the male-only clinics performed more vasectomies, there was no difference in client satisfaction between services provided at integrated clinics and services offered at separate clinics (Vernon, Ojeda, & Vega, 1991). In countries where cultural norms mandate the segregation of men and women, however, it may be more appropriate to organize male-only clinics, to generate interest among potential male clients (Wegner et al., 1998). Regardless of where vasectomy services are provided, it is essential to ensure that health care providers are trained in counseling so they can address clients' questions, resolve their doubts, and reduce their anxieties about vasectomy. Couples counseling for men seeking vasectomy services should be encouraged (AVSC International, 1997).

Fees and compensation programs

The promotion of family planning through financial payments is one of the most controversial and divisive issues in population and development policy. Critics of payments to clients, referrers, or providers have expressed concern that these incentives may jeopardize the principle of informed consent. Some have argued that provider rewards, in the form of special recognition or financial compensation for achieving or reaching specific contraceptive targets, could lead to persuasion that borders on coercion of clients to accept specific contraceptive methods (Cleland & Mauldin, 1991). Further, when these payments are in place, providers may be biased about the side effects of other methods and may steer clients toward sterilization.

Advocates of client compensation schemes argue that the payments cover lost wages and the direct costs of food and transport that are associated with undergoing the sterilization procedure and do not act as an inducement or incentive to accept sterilization. Research in Bangladesh and India suggests that for the large majority of clients, where financial payments are offered, they are not a motivating factor for the decision to obtain sterilization; rather, the payment can remove barriers to access to services (Cleland & Mauldin, 1991; Landry, 1990; Saavala, 1999). Nevertheless, of the countries that historically have offered financial payments to promote family planning, few still make use of client payments and worker incentives and targets.

In 1999, EngenderHealth surveyed its staff in 25 countries to assess the status of any remaining programs that offer compensation or payments to sterilization clients, providers, or referrers. In four of the countries surveyed—Bangladesh, India, Pakistan, and Vietnam—sterilization clients were offered cash payments as compensation for lost wages. Payments were offered to providers in Bangladesh, Nepal, Pakistan, and Vietnam (AVSC International, 1999), and payments were provided to community-based delivery (CBD) agents or other family planning program referral agents in Bangladesh, Indonesia (although only to some referrers), Pakistan, and Vietnam.

Despite the presence of compensation schemes in these countries, there is little evidence that such approaches have promoted reliance on sterilization. Indeed, steril-

ization use has declined during the last 10 years in Bangladesh, despite the presence of payments to clients, an increase in client payments to offset inflation (in 1996), and reimbursement of travel payments to government field workers (Begum et al., 2000).

Cost of providing services

Until fairly recently, little attention was paid to how to develop models for providing reproductive health services in the current climate of health-sector reform. Many countries are undergoing a transition from an era in which health care services (including sterilization) were provided free of charge or at minimal cost (Ross & Frankenberg, 1993) to a time of experimenting with cost-sharing and introducing user fees for services. Thus, it is crucial for program managers to understand the costs associated with providing sterilization services.

Estimates of the cost of sterilization commodities may vary greatly by country, in part because these costs depend on where the commodities are purchased, the volume of each purchase, and packaging and shipping. A 1994 United Nations Population Fund study provided global estimates of the costs of sterilization commodities, using information from a variety of sources (UNFPA, 1994). After estimating the average number of uses of minilaparotomy and vasectomy kits and Laprocator® systems, as well as the number of gloves, gauze pads, sutures, and cold sterilization solutions needed, the authors calculated the average cost for female and male sterilization commodities in 1994 to be US$10.38 per procedure. The authors reported that equipment and supplies required for sterilization increased in price by about 5% from 1990 to 1993 (UNFPA, 1994). At the same rate of increase, the cost of sterilization commodities in 2000 would be $11.63 per procedure.

The cost of sterilization commodities is just one component of an estimate of the overall cost of providing sterilization services. The total cost per client visit includes costs of all supplies, as well as personnel time spent not only on delivering services (including counseling and informed consent) to the client, but also on providing support activities (such as keeping the facility clean and maintaining records). The true cost also includes capital costs such as buildings, equipment, and other infrastructure. Capital costs typically are not included in family planning cost studies, however, because data on these costs are hard to obtain, as capital equipment and buildings are often donated or purchased in bulk for multiple uses. In addition, the marginal capital costs of adding new reproductive health services to existing infrastructure—a key concern for managers interested in expanding service-delivery capacity—are thought to be small (Mitchell, Littlefield, & Gütter, 1999).

Numerous studies have assessed the costs of sterilization (along with other family planning services); however, the results are difficult to compare across countries because of wide variations in economic conditions, family planning programs, and study methodologies. Some include commodity costs in their estimates, and some do not. Authors of studies conducted in countries where commodities are offered free of charge by donor organizations reason that they should not include the costs of these supplies, but only the expenses incurred by the program under observation. Other investigators have examined the true costs, including commodity costs, anticipating the possibility that if donor monies were withdrawn, the full cost would need to be covered by the programs themselves. Aside from these differences, studies take different approaches to the estimation of personnel costs, which constitute the largest percentage of total costs in most programs. As noted by Janowitz, Measham, and West (1999), variations in the amount of time that personnel devote to various types of visits and in unused time can significantly influence the costs of services. Standard methodologies rarely measure these personnel costs.

While various approaches and methodologies (often complicated or requiring technical expertise) have been used to study costs, simple-to-use tools have been developed in recent years to assist managers of family planning or other health services in deter-

mining the actual and potential costs of service provision. Two such approaches that have been used in developing country programs are the Cost Revenue (CORE) Analysis Tool (Management Sciences for Health, 1998) and the Cost Analysis Tool (AVSC International, 2000).

Demand Factors

As described in Table 1.1, several issues affect clients' access to quality sterilization services: factors affecting clients' decision making (such as informed consent and informed choice), sociocultural and gender influences, community effects, policy and program factors, and service-delivery issues.

Informed choice

Clients who make informed decisions about sterilization are more likely to be satisfied with their contraceptive method and to experience less regret than if they are not the actors in the decision-making process.

Informed choice is a fundamental principle of quality services, is recognized as a human right by the international community (UN, 1994), and is the basic foundation of all sterilization programs. Despite widespread support for informed choice in international conventions, in professional discourse, and in program policies, clients in many parts of the world lack truly informed choice. Barriers exist within the social and community context in which services are provided, at the level of program policy and design, and in actual service delivery. This section, therefore, describes the process for informed choice in a service-delivery setting and addresses some of the special issues and challenges related to informed choice and informed consent for sterilization from a client perspective.

Clients who make informed decisions about sterilization are more likely to be satisfied with their contraceptive method and to experience less regret than if they are not the actors in the decision-making process (Hardy et al., 1996; Vieira & Ford, 1996). Before moving into the discussion of informed choice and factors within and outside the health care system, we define the basic terms of informed choice, informed consent, and counseling.

Informed choice in health care is an individual's well-considered, voluntary decision, based on method or treatment options, information, and understanding. It is something that the individual experiences as an interplay of factors related to:

- His or her own personal circumstances, beliefs, and preferences
- The sociocultural and health and human rights context and community factors
- The availability and attributes of method or service options
- Service-delivery factors that affect access to options and the individual's ability to make free and voluntary decisions

Informed choice in family planning has several key elements. First, it is voluntary, meaning that options are not limited by access barriers or by coercion, stress, or pressure. Additionally, the client should have information about contraceptive options and about the various methods' relative effectiveness in preventing both pregnancy and sexually transmitted infections (STIs), their advantages and disadvantages, their contraindications, and their complications and side effects. Finally, there should be a real choice among a range of accessible alternatives.

Informed consent is a client's agreement to receive medical treatment or to take part in a study as a result of having reached an informed choice. Written informed consent is universally required to authorize surgery, including sterilization—although in and of itself, a signed informed consent form does not guarantee informed choice. The key points that a client should know to give truly informed consent for sterilization are that:

- Temporary methods of contraception are available.
- Sterilization involves a surgical procedure (the details of which need to be explained before consent is given).
- The surgical procedure involves risks in addition to benefits (both of which need to be explained as part of the informed choice process).

- If the procedure is successful, the client will not be able to have any more children.
- The effect of the procedure is permanent, though there is a small risk of failure.
- The client can change his or her mind and decide against the procedure at any time before the operation is performed, with no resulting loss of medical, health, or other benefits or services.
- Sterilization does not provide any protection against STIs or HIV/AIDS.

Counseling refers to two-way communication between a health care worker and a client with the specific purposes of helping the client confirm or reach an informed decision, helping the client understand how to use his or her chosen method or treatment, and addressing any questions or concerns the client may have. Counseling serves as a checkpoint to ensure that the client has correct information on which to base a choice and that he or she is not being pressured or coerced. Counseling thus helps clients exercise their right and ability to make their own decisions, thereby safeguarding informed choice.

While informed choice applies to all health care decisions, it is of particular importance for sterilization, both because the procedure involves elective surgery, with its attendant risks and unique fears, and because it is the only contraceptive method intended to end fertility permanently. The decision to have no more children does not necessarily mean that the client is ready to undergo an operation to end fertility. With the exception of medical obstetric emergencies, even in cases where there are medical indications for preventing pregnancy, a woman still has options and should be assisted to make a reasonable choice that suits her health status, personal circumstances, beliefs, and preferences; if she is unable to make the decision, a family member should be consulted whenever possible.

To ensure that clients who choose sterilization make a truly informed choice, counselors need to explore clients' feelings about ending fertility and their readiness for the procedure. This process helps identify clients who have doubts, hold unrealistic expectations, or have requested sterilization in response to short-term life stresses or external pressure. Each of these factors increases the risk of postoperative regret (Chi & Thapa, 1993; Keller, 1997; WHO, 1988; WHO, 1992). (Chapter 5 includes a detailed discussion of regret in the context of sterilization.)

Written informed consent for sterilization should document, but does not substitute for, a health care worker's active involvement in the client's informed choice process, to ensure that the client has knowingly and freely requested sterilization. Often someone other than the surgeon obtains informed consent for sterilization. Therefore, the ultimate responsibility for ensuring informed choice lies with the surgeon, who must verify that the client reached an informed choice and gave informed consent prior to surgery.

Sociocultural, gender, and community influences

Sociocultural factors, commonly held beliefs, social norms, and the client's status within the society and the family powerfully determine desired family size, perceptions of what is desirable and undesirable in a family planning method, the ability to access information and services, and the ability to make autonomous decisions. Marginalized groups, including poor, uneducated women and youth, often lack access to choices and have limited decision-making power. In some societies, the social norm is for partners and mothers-in-law to make decisions about the number and timing of a woman's pregnancies and about whether and how she will limit her fertility. Moreover, in some places where men exercise much influence over the choice of family planning methods, the society does not support vasectomy as an option, often because of misunderstandings about the method: Men and women in several countries have voiced fears of physical and sexual impotence and of a reduced ability to do physical labor (Bertrand et al., 1989; Schuler, Hashemi, & Jenkins, 1995; Shrestha, Stoeckel, & Tuladhar, 1988; Vieira & Ford, 1996). (Chapter 5 provides more information on misconceptions about female and male sterilization.)

Clients obtain much of the information on which they base their family planning decisions from sources within the community. These sources are of varying accuracy, completeness, and credibility. Family members and friends often are the primary sources of information, but their knowledge may be based on their own method use and may be biased by their positive or negative experiences (see Chapter 5 for more information). Religious leaders, community volunteers, health care workers, and referral agents also play important roles that contribute to clients' knowledge, perceptions, and choices. In addition, the media are common sources of information, although messages may be specific to particular methods or motivational rather than balanced and objective. Increasingly, programs recognize the importance of the community's influence, not only in the availability and use of services, but also in their quality. Some programs are now using innovative participatory tools to engage communities in a dialogue about how to improve services (CARE, 1999; Chambers, 1997; Dohlie et al., 2000; Gubbels & Koss, 2000).

Policy and program factors

A number of factors related to program policies and design directly bear on the range of contraceptive methods offered, an individual client's access to available options, and his or her ability to choose freely. Any factor that either limits a client's access to information or services or creates biases or pressures in favor of a preferred method is a challenge to informed choice.

With regard to access, any program that offers a limited range of family planning methods compromises informed choice by limiting a client's options. Eligibility criteria such as age, parity, and spousal or parental consent can override clients' decision making and may deny some clients their preferred method. Waiting periods, spousal consent, and high age and parity requirements are commonly imposed for sterilization and raise potential concerns about clients' access to desired information and services. In Brazil, the excessive documentation required for female sterilization was found to result in barriers to women's access to sterilization services (Lassner, Janowitz, & Rodrigues, 1986); requirements were later simplified. A three-city study of poor women in the United States found that institutional or procedural barriers contributed to unfulfilled sterilization plans, resulting in regret for not having become sterilized (Davidson et al., 1990). (Chapter 5 presents a discussion of other barriers to sterilization.)

The issue of informed consent has raised concerns, particularly in regard to population policies in which sterilization played a major role. For example, at various times in the history of China, India, and the United States, sterilizations have been performed without individuals' informed consent. Physical or psychological pressure have been applied and full, detailed information has not been provided; in China and India, incentives and disincentives have been used and were even written into local laws in both countries (Boland, 1997).

On the other hand, program targets or quotas and performance-based funding and reporting requirements may bias providers toward a particular method, thus leading them to direct clients to a predetermined choice rather than allowing them to decide freely. And some programs still use as a performance indicator the measure couple-years of protection (CYP), which is biased in favor of sterilization because of that method's long-term protection against pregnancy.

Where method-related payments are made to providers, referral agents, and clients, they are most often made for sterilization, a situation that could compromise free and informed choice. Additionally, mobile service settings, also often associated with sterilization, can threaten informed choice by limiting effective access to a range of methods and follow-up care and by compromising counseling as a result of serving a large number of clients in a limited period of time.

Service-delivery factors

The service-delivery point is the critical locus of contact between the health care delivery system and the individual client. For truly informed choice, it is essential to make a

wide choice of methods available, either at the site or through effective referral mechanisms, by modifying scheduling, ensuring continuous commodity supplies, and reviewing fees to maximize access to the most choices for the most clients.

The rights and needs of clients cannot be fully addressed without identifying and meeting provider needs (Huezo & Diaz, 1993). Many providers strive to achieve quality services but lack the necessary skills, training, and general support from their supervisors or institutions. Providers need clear guidelines and standards that are developed or adapted for the context in which they work. They need reliable, ongoing supervision that facilitates work, helps to resolve problems, and develops their knowledge and skills. They must also have the opportunity for special training when it is indicated. Attending to provider needs requires strong organizations that can deliver effective supervision and training while empowering and supporting problem-solving by clinic staff.

Such variables as clinic schedule (both overall and for specific services and methods), commodity supply, fees, interpretation and application of eligibility criteria, and number of required laboratory tests and visits for particular methods differ from service point to service point, but all affect clients' access to a choice of methods.

Addressing provider needs

To provide informed choice for more sterilization clients, providers must cope with very real constraints on their time and resources. Ways in which to do this include maximizing the use of available opportunities, staff, and volunteers to inform clients; using space creatively to ensure privacy during counseling; identifying and meeting providers' needs to help them do their job well; developing and testing new job aids and service models; reinforcing training with supportive supervision and self-assessment tools; and focusing on the six essential aspects of the provider's role in helping clients make informed choices:

- Assessing client needs
- Offering method options
- Filling gaps in clients' knowledge and answering their questions
- Helping clients exercise their right and ability to make their own choice, to ensure that their decision is voluntary, appropriate, and well-considered
- Helping clients understand how to use their chosen method correctly
- Providing ongoing client support for other reproductive health services

The practices of individual providers, and at times program or institutional guidelines, either support or undermine the client's right and ability to make informed, autonomous decisions. For example, risk data (e.g., age or parity) often guide decision making in clinical practice: Health providers refer to population-based risk data to "tailor advice and treatment to individual [clients]" (Maine et al., 1994). Although risk data are based on epidemiological science, they are not objective measures in decision making; using them to determine need for sterilization raises concerns about informed choice. Physicians who identify a particular health condition may advise women to undergo sterilization without fully exploring other available contraceptive options (AVSC International, 1998). For example, in a study conducted in Brazil (before a ban on nonmedical sterilizations was lifted), physicians considered certain medical conditions (e.g., AIDS, arterial hypertension, or three or more previous cesarean sections) to be indicators of a need for sterilization (Berquo et al., 1996).

Providers' attitudes toward particular client groups or family planning methods can influence their interaction with clients and the options they offer them. Their knowledge and communication skills, as well as their awareness of clients' reproductive rights and the cultural factors that influence their decision making, govern how effectively providers assess clients' needs, help clients understand their options, and confirm or reach their own well-considered decisions.

Addressing the intentions and needs of different groups

Reproductive health services must start with the individual client as a whole person whose needs may change over the course of a lifetime, and must include access to different contraceptive options throughout a person's reproductive years. If services are to be responsive to client needs, they must be client-centered, respectful of rights, and comprehensive. Clients with special needs include postpartum women, postabortion women, people living in distressed situations (e.g., refugees, victims of natural disasters, or oppressed minorities), and men in general.

The popularity of postpartum sterilization (performed within 42 days after delivery) appears to have grown, particularly in developing countries (Chi & Thapa, 1993). Postpartum procedures are more common than interval sterilizations in seven out of 10 Latin American and Caribbean countries examined in Chapter 3, as well as in the Philippines and in some Sub-Saharan African countries (Botswana, Tanzania, Zambia, and Zimbabwe). Chi and Thapa (1993) cite the desire for smaller families, increases in hospital deliveries, and restrictive policies toward interval sterilization procedures in some countries as reasons for the growing demand for postpartum sterilization.

The timing of decision making on sterilization can affect how well-considered the decision is and the likelihood of subsequent satisfaction or regret, regardless of whether a woman or man is having the procedure. Although sterilization can be performed safely and conveniently immediately postpartum or postabortion, the stress of labor or abortion makes the period before, during, and just after a pregnancy-related event a poor time to counsel and obtain informed consent from a client who is considering sterilization. Ideally, informed choice and consent for postpartum or postabortion sterilization should be completed well in advance of labor or pregnancy termination. When this is not possible, it is advisable for the client to use a temporary family planning method during the postpartum period while taking the time to reach a fully informed and well-considered decision about ending fertility.

Further, individuals living in distressed situations should be carefully counseled about the use of sterilization. Providers can help these special populations assess whether sterilization is the right choice for them and how they might feel when or if their circumstances change, and can provide them with effective temporary methods in the meantime (AVSC International, 1995).

The 1994 ICPD Programme of Action recognized the importance of men's own reproductive health needs (UN, 1994). Paying attention to men's reproductive health needs and encouraging them to participate in reproductive health activities is a good strategy for improving women's reproductive health. Some health care professionals argue against this idea, saying that men are already too involved—they hold too much power over decisions affecting women's fertility and health. However, men's participation in reproductive health activities is critical to help stop the spread of STIs and, in general, to help improve women's health, by supporting their use of family planning or by using a method themselves, such as condoms or vasectomy (Drennan, 1998).

The stress of labor or abortion makes the period before, during, and just after a pregnancy-related event a poor time to counsel and obtain informed consent from a client who is considering sterilization.

Communications

Strategies and safeguards at several levels can support, promote, and protect informed choice. Most broadly, health professionals can embrace an expanded conceptual framework for informed choice that extends beyond the clinic walls to incorporate broader social aspects of decision making and access to services. Agencies should forge alliances and create or join multisectoral coalitions to advocate for social and policy change to support clients' rights, including the right to informed choice. This effort should include increasing client and community participation in public information efforts, as well as designing and evaluating programs to better understand and meet client needs and to make the programs more accountable to the communities they serve (AVSC International, 1999).

Other important strategies are strengthening and expanding public education efforts to increase the public's knowledge about their reproductive health and rights and their contraceptive options, correcting misinformation, and reducing stigma. Maximizing the

use of all available communication channels to inform the public and to reduce the burden on facility staff will advance the goal of informed decision making for more clients. Involving field workers, community volunteers, peer educators, satisfied users, pharmacists, and CBD workers can help to extend the reach of information and education efforts. Moreover, giving men an opportunity to discuss vasectomy with other men who have had the procedure is a key step in the decision-making process (Landry & Ward, 1997; Vernon, 1996; Wegner et al., 1998).

Client-provider interactions

At the service site, programs can make client-provider interactions more client-centered and counseling more effective by emphasizing that informed choice is the client's right and by clearly defining expectations and rewarding performance that supports that right. Staff training can be expanded by using new approaches to increase providers' awareness of clients' reproductive rights and to sensitize them about power imbalances in service delivery, as well as by increasing their comfort in addressing sensitive topics associated with sexuality and their ability to communicate with clients about them.

Providers also need training in how to foster couple or spousal communication in reproductive health decision making. More than 40 years of research consistently shows that men and women who discuss family planning are more likely to use contraception effectively (Drennan, 1998). Nonetheless, there may be times when couple communication is impossible. For example, providers need to be aware if a woman is being abused by her partner or is practicing contraception covertly, and they must use their judgment about the appropriateness of encouraging communication (Drennan, 1998; Wegner et al., 1998).

Cultural sensitivities around topics related to sexuality inhibit both clients and providers, challenging communication. In addition, power imbalances between providers and clients based on differences in gender, education, and economic status pose significant challenges for effective client-provider interactions.

Challenges: Continuity of Care for Sterilization Clients

Since limiting childbearing is one of the main reasons for choosing sterilization, many women who are sterilized often do not perceive a need for further reproductive health services after the procedure (Cates & Stone, 1992). For many women, family planning and maternal and child health services are their only contact with the health care system, and once they cease childbearing and have no further need of contraceptives, their incentive or perceived need for seeking out other reproductive health services may be low. Yet even in the absence of a need for contraception, some reproductive health issues—for example, cervical cancer screening and STI prevention—need attention.

Most women in developing countries who choose sterilization as their family planning method do so in their late 20s or early 30s. If they no longer consider reproductive health needs a priority, they are unlikely to seek cervical cancer screening services, just when it is most important for them to do so. Women in their 30s and 40s are at the highest risk for precancerous lesions, and screening should initially focus on these women. Progression from lesions to cervical cancer is a long process—perhaps 10 years or more—so opportunities to prevent cancer in later life are critical for this age-group. In settings where services are available, women undergoing sterilization should be educated about the importance of screening for the prevention of cervical cancer. When women who are older than 30 seek sterilization services, this could represent an opportunity for providers to screen them for cervical cancer. Such a strategy may be less of an issue for women living in developing countries that have well-established cervical cancer screening programs, as many may be accustomed to having regular Pap smears.

Two U.S. studies examining the correlation between sterilization use, high-risk behavior, and condom use show that sterilized women may be at greater risk for STI/HIV infection than women who have not been sterilized (Cates & Stone, 1992; Santelli et al., 1992). This highlights the importance of integrating STI/HIV prevention efforts into presterilization and poststerilization counseling and of ensuring that once they are sterilized, women continue to have access to other reproductive health services.

Another U.S. study showed that sterilized women attending a drug treatment program were less likely to use condoms than were nonsterilized women, even when the data were adjusted for a variety of confounding factors (Armstrong et al., 1992). Furthermore, most sterilized women did not perceive a need for reproductive health services, yet when counseling and gynecological services were provided, they used them. The study's authors concluded that when STI services are provided to sterilized women who are at increased risk for STI/HIV infection, women will be encouraged to take preventive measures to guard against transmission of infections.

A 1989–1990 study comparing personal risk behavior[3] and partner risk behavior[4] among sterilized and nonsterilized women showed that more than one-third of both sterilized and nonsterilized women had a personal or partner risk factor for STIs. Among other findings, 78% of women who had been sterilized reported not currently using a condom, compared with 46% of nonsterilized women. The study concluded that STI/HIV risk-reduction counseling should be offered both before and after sterilization, and that STI/HIV risk assessment should be integral to sterilization counseling and to provider training (Santelli et al., 1992).

Data are lacking on the reproductive health needs of sterilization users in developing countries. In one study in Brazil, researchers found that sterilized women were less likely than were nonsterilized women to have used condoms for protection against STI/HIV infection (Barbosa & Villela, 1995).

Moreover, little is known about the ability of sterilized women to negotiate the use of condoms, which may provide some protection from STIs and other culturally specific reproductive health problems. Entrenched gender roles in highly patriarchal societies may prevent or inhibit the negotiation of condom use. Cultural taboos against discussing sex limit practical negotiations. In some societies, the association between condoms and commercial sex makes condoms unacceptable for use in stable partnerships. In others, men consider condom use a major barrier to their sexual satisfaction (Bawah et al., 1999; Cates & Stone, 1992).

Providing reproductive services to men has not been the norm of family planning programs and has only begun to receive increased attention in recent years. This closer focus on men's services grew out of the Cairo and Beijing conferences (UN, 1994; UN, 1996). Further, widespread STI/HIV transmission has brought to public attention the need for both men and women to understand what behaviors may increase the risk for contracting and transmitting such infections. The widespread transmission of these infections has also heightened awareness of how power imbalances between men and women may play a role in increasing women's risk for STIs and other illnesses.

In one study on vasectomy decision making, researchers reported that some men identified as an advantage of using vasectomy that it protected them against pregnancy with more than one sexual partner (Landry & Ward, 1997). None of the men interviewed cited the lack of STI/HIV protection as an issue with or a disadvantage of vasectomy. Thus, all

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[3] Personal risk behavior was defined as having had more than one sex partner during the year preceding the survey, having used injectable drugs during the month preceding the survey, ever having been in a drug treatment program, ever having received money or drugs for sex, having been treated for STIs during the six months preceding the survey, having used drugs during the last sexual episode, or having used alcohol during the last sexual episode (which was associated with nonuse of condoms).

[4] Partner risk behavior was defined as having had sex during the six months preceding the survey with someone who had an STI, had AIDS, was a prostitute, used injectable drugs, or was bisexual or homosexual.

counseling for vasectomy should include the fact that it does not provide protection against STIs/HIV and should stress the importance of dual protection—use of one method for family planning (i.e., vasectomy) and another method for disease prevention (condoms).

The information that we have to date on sterilization users' knowledge about the need to use condoms when engaging in risky sexual behavior is not promising. However, family planning programs have begun to incorporate messages about condom use into counseling for sterilization users. Since sterilization prevalence will continue to grow, programs must further develop interventions for reaching these men and women with reproductive health information and services.

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Chapter 2

Sterilization Incidence and Prevalence

Highlights:

- Approximately 222 million women of reproductive age around the world are protected from unintended pregnancy by sterilization—180 million using female sterilization and nearly 43 million relying on male sterilization.
- The incidence of female sterilization (the number of sterilization procedures performed each year) is highest in Latin America and the Caribbean and is lowest in Eastern Europe, North Africa, and the Middle East.
- The prevalence of female sterilization (the total number of people using the method at a particular point in time) is highest in Latin America and the Caribbean and in Asia. In contrast, the prevalence of male sterilization is highest in parts of Western Europe, in North America, and in Asia.
- Most sterilization users live in Asia, with China and India accounting for 75% of the world's total number of sterilization users.

In 1985, Ross, Hong, and Huber concluded that overall use of contraceptive sterilization had been growing considerably worldwide over a number of years and showed no signs of decline anywhere. Here, we examine trends in new and continued use of sterilization that have taken place since 1985 and explore some of the factors that have produced these changes. Because of this chapter's population-level focus, the analysis here will be limited primarily to the demographic factors affecting change. Programmatic, political, sociocultural, and technological factors affecting choice and use are discussed more fully in subsequent chapters.

Information on the use of sterilization within a population is usually expressed in terms of incidence and prevalence. Sterilization *incidence* refers to the rate at which people in a given population begin to use sterilization, over a specified period of time (usually one year), relative to the number of women aged 15–44 or 15–49 who were married or in union during that time period. In practical terms, it reflects the number of sterilization procedures performed annually among people of reproductive age. Because it is difficult to obtain the accurate national-level service statistics needed to derive direct measures of sterilization incidence, we rely on surveys of women of reproductive age to estimate an approximate incidence measure.[1]

Within the context of sterilization, *prevalence* provides a "snapshot" of overall levels of sterilization use, measuring the number of people in a population using this

[1] In this chapter, we present a proxy measure of incidence derived from demographic surveys, as direct measures of incidence were not obtainable. For these analyses, sterilizations in the year are obtained among women ever in union, either by using questions about the respondent's age at sterilization compared with her current age or by using the date of sterilization. Information on the number of new vasectomy users in the year is obtained from female partners who answered the survey. In general, the countries reviewed in this chapter all had a total sterilization prevalence of at least 2%, as given in recent surveys. (Although this threshold is arbitrary, any percentage smaller than 2% would be statistically unreliable for performing calculations of incidence.)

method at a given point in time. According to conventional practice, sterilization prevalence is often presented as a percentage, with the number of sterilization users expressed relative to the number of women currently married or in union (Bertrand, Magnani, & Knowles, 1994), and is measured using data from surveys of women of reproductive age (generally aged 15–49). In countries where there is substantial use of vasectomy, the prevalence of sterilization among men is obtainable through women's reports of their partner's use of vasectomy.

Any family planning method's prevalence and incidence are linked, since "in the long run, the prevalence of any method is directly proportional to the annual acceptance rate (or incidence) and the mean continuation time" (Ross, 1992). Although prevalence is often used to compare levels of use across different contraceptive methods within a population, sterilization's uniqueness as a permanent method warrants special consideration in this type of analysis. Unlike temporary methods, such as the pill or condom, that can be discontinued at any time, protection with sterilization continues throughout the reproductive years (except in the case of failure). As a result, the number of sterilization users grows over time. Women leave this "pool" of users only when they exceed reproductive age.

The data presented in this chapter are derived primarily from the Demographic and Health Survey (DHS) and the U.S. Centers for Disease Control and Prevention (CDC) series of family planning and reproductive health surveys. Most are nationally representative household-based sample surveys. For North America, Oceania (Australia and New Zealand), and Western Europe, most data are derived from surveys conducted by agencies within the country. In general, these surveys tend to present information on contraceptive use as reported by women, though this practice is changing to include male interviews as well (e.g., in Bangladesh, Colombia, Kenya, Pakistan, and Tanzania). For this analysis, however, we present data as reported by women. Also, we include consecutive reproductive health surveys whenever possible, starting from 1985. The data presented for these multiple surveys are cross-sectional, as different sets of respondents were sampled and interviewed each time the survey was carried out.

Global Status of Sterilization

Worldwide, at least 222.4 million women in union currently use sterilization (whether tubal ligation or vasectomy) as their method of family planning. Supplements 2.1 and 2.2 (page 47) report the estimated numbers of sterilization users for different regions and countries. Two factors affect the number of users in a country: the overall population, and the prevalence of sterilization (Ross et al., 1985). In turn, sterilization prevalence is a product of sterilization incidence and the continuation time of the method.

In this chapter, we look at global data on overall sterilization incidence and prevalence, as well as the number of users since the 1980s. All three measures are broken down separately for female and male sterilization, when possible. In addition, we include information on sterilization as a percentage of total contraceptive prevalence (use of both traditional and modern methods), to provide a context in which to consider sterilization's contribution to overall contraceptive use.

Incidence

Recent data show that regions vary considerably in their sterilization incidence. Table 2.1 (page 20) summarizes the approximate average incidence of female and male sterilization for selected countries with data available from the DHS or CDC surveys, calculated over five-year periods.[2] (Annual estimates are presented in Supplements 2.3 and 2.4, pages 52 and 54, respectively.)

[2] U.S. data are derived from the National Survey of Fertility Growth (NSFG).

What accounts for changes in incidence?

Demographic, policy, or program factors all can cause changes in the incidence of sterilization. Demographic factors that may influence sterilization incidence include changes in the age distribution, the percentage married or cohabiting, the average age at marriage, the average parity, and mean educational attainment. Policy factors that can influence incidence are illustrated historically in countries such as Bangladesh, India, and Sri Lanka, where sterilization incidence has fluctuated over the past three decades (Ross et al., 1985). Incidence in these countries dropped substantially in the late 1970s, at the end of an era of special national sterilization campaigns.

For example, in India, changes in sterilization incidence coincided in the 1970s with government-led interventions to increase the sterilization acceptance rate through massive recruitment campaigns and some coercion, and with the ebb and flow of payments made to new users. In India, sterilization incidence reached a high of 7% of all couples at the time of the 1976 Emergency Campaign and dropped to about 2% among married women five years later (Ross et al., 1985). This decline in sterilization incidence coincided with a governmental effort to remove method-specific contraceptive targets nationwide. This effort was followed by India's approval, in 2000, of a national population policy articulating demographic goals but balancing the twin objectives of reducing fertility and promoting reproductive health, as was advocated in the Programme of Action adopted at the 1994 International Conference on Population and Development in Cairo (Pachauri, 2000).

Changes in incidence may also correspond to shifts in demographics. As couples age or reach their desired family size, the incidence of sterilization may change year by year, growing sometimes more quickly and sometimes more slowly. In a number of Latin American countries, for example, both the number of couples reaching their reproductive years and the number seeking to limit their family size have increased greatly since the 1960s (Merrick, 1994); these factors may explain the growth in incidence of sterilization, particularly female sterilization. The influence of demographic factors on sterilization incidence is well illustrated in the case of China. China's irregular age distribution, influenced by famines and changes in the legally permissible marriage age, produced dramatic changes in the number of new users of sterilization over the past several decades (Ross & Frejka, 1998).

Demographic and policy factors are generally considered to have less influence on incidence than program factors. Sterilization incidence fluctuates depending on the numbers of unsterilized couples in the relevant age-groups, which change from year to year. It can decline when the prevalence of use of other modern contraceptive methods is quite high, or when sterilization prevalence itself has risen to a high level (Ross & Potter, 1980; Ross et al., 1985), as in countries such as India, Sri Lanka, and Thailand. Findings from a recent sterilization assessment in Bangladesh show that policy, program, and management factors all had an impact on the decline in sterilization incidence (Begum et al., 2000).

A change in the method mix—i.e., in the range of modern contraceptive methods available to couples—can also influence the rate of acceptance of sterilization. For example, in many countries where the intrauterine device (IUD) has been made available and accessible, this long-acting method may have become a partial substitute for earlier sterilization. The IUD has played a significant role in some countries where sterilization has never caught on—for example, in many Middle Eastern countries, such as Egypt, Jordan, Syria, and Turkey. In Indonesia, Norplant implants have had the same effect. The injectable hormonal contraceptive Depo-Provera has also become a popular method, perhaps especially in countries where social acceptance of family planning may be limited, where clandestine use (i.e., women's use of a method without their partner's knowledge) is more prevalent, or where fertility preferences reinforce a high demand for reversible family planning methods.

Table 2.1. Average five-year incidence of female and male sterilization per 100 women of reproductive age (15–49) who were ever in union, by selected countries, year, and source of data

Country/year/source	Female sterilization	Male sterilization
Bangladesh, 1987 (DHS)	2.2*	0.5
Bangladesh, 1993–1994 (DHS)	0.4	0.0
Bangladesh, 1996–1997 (DHS)	0.2	md
Belize, 1991 (CDC)†	1.7	<0.1
Bolivia, 1989 (DHS)	0.4	0.0
Bolivia, 1993–1994 (DHS)	0.4	0.0
Bolivia, 1998 (DHS)	0.5	0.0
Brazil, 1986 (DHS)†	3.0	0.1
Brazil, 1991 (DHS)‡	3.3	0.0
Brazil, 1996 (DHS)	2.5	0.3
Cape Verde, 1998 (CDC)	1.4	<0.1
Colombia, 1986 (DHS)	1.7	0.0
Colombia, 1990 (DHS)	1.7	0.1
Colombia, 1995 (DHS)	1.8	0.1
Costa Rica, 1993 (CDC)	1.6	<0.1
Dominican Republic, 1986 (DHS)	2.7	0.0
Dominican Republic, 1991 (DHS)	2.9	0.0
Dominican Republic, 1996 (DHS)	2.6	0.0
Ecuador, 1987 (DHS)	1.4	0.0
Ecuador, 1989 (CDC)	1.4	0.0
Ecuador, 1994 (CDC)	1.5	0.0
Ecuador, 1999 (CDC)	1.6	0.0
Egypt, 1988 (DHS)	0.1	0.0
Egypt, 1992 (DHS)	0.1	0.0
Egypt, 1995–1996 (DHS)	0.1	0.0
El Salvador, 1985 (DHS)	3.0	0.0
El Salvador, 1988 (CDC)†	2.5	0.0
El Salvador, 1993 (CDC)	2.0	0.0
El Salvador, 1998 (CDC)	1.9	0.0
Ghana, 1988 (DHS)	0.0	0.0
Ghana, 1993 (DHS)	0.1	0.0
Guatemala, 1987 (DHS)†	1.0	0.1
Guatemala, 1995 (DHS)	1.0	0.1
Honduras, 1996 (CDC)	1.5	0.0
India, 1992–1993 (DHS)	1.8	0.1
Indonesia, 1987 (DHS)	0.3	0.0
Indonesia, 1991 (DHS)	0.2	0.0
Indonesia, 1994 (DHS)	0.2	0.1
Indonesia, 1997 (DHS)	0.2	0.0
Jamaica, 1997 (CDC)	0.8	0.0
Jordan, 1990 (DHS)§	0.5	0.0
Kenya, 1989 (DHS)	0.0	0.0
Kenya, 1993 (DHS)	0.7	0.0
Kenya, 1998 (DHS)	0.4	0.0
Mauritius, 1985 (CDC)‖	0.5	0.0
Mauritius, 1991 (CDC)†	0.7	0.0

(cont'd.)

Table 2.1. Average five-year incidence of female and male sterilization per 100 women of reproductive age (15–49) who were ever in union, by selected countries, year, and source of data *(cont'd.)*

Country/year/source	Female sterilization	Male sterilization
Mexico, 1987 (DHS)	1.9	0.1
Morocco, 1987 (DHS)	0.2	0.0
Morocco, 1992 (DHS)	0.2	0.0
Namibia, 1992 (DHS)	0.7	0.0
Nepal, 1996 (DHS)	0.0	0.0
Nicaragua, 1992–1993 (CDC)	1.6	0.0
Nicaragua, 1998 (DHS)	2.5	0.0
Panama, 1984 (CDC)	2.7	0.0
Paraguay, 1987 (CDC)	0.4	0.0
Paraguay, 1990 (DHS)	0.8	0.0
Paraguay, 1995–1996 (CDC)	0.5	0.0
Paraguay, 1998 (CDC)	0.9	0.0
Peru, 1986 (DHS)	0.5	0.0
Peru, 1991–1992 (DHS)	0.6	0.0
Peru, 1996 (DHS)	0.8	0.0
Philippines, 1993 (DHS)	0.7	0.0
Philippines, 1998 (DHS)	0.5	0.0
Puerto Rico, 1995–1996 (CDC)	2.4	md
Romania, 1999 (CDC)†	0.1	0.0
Sri Lanka, 1987 (DHS)	2.2	0.5
Swaziland, 1988 (CDC)	0.4	md
Tanzania, 1991–1992 (DHS)	0.3	0.0
Tanzania, 1996 (DHS)	0.2	0.0
Thailand, 1987 (DHS)	1.9	0.5
Trinidad and Tobago, 1987 (DHS)	0.8	0.0
Tunisia, 1988 (DHS)	1.1	0.0
Turkey, 1993 (DHS)	0.3	0.0
Ukraine, 1999 (CDC)†	0.1	0.0
United States, 1988 (NSFG)	8.4	md
United States, 1995 (NSFG)	6.5	md
Zambia, 1992 (DHS)	0.2	0.0
Zambia, 1996 (DHS)	0.2	0.0
Zimbabwe, 1988–1989 (DHS)	0.2	0.0
Zimbabwe, 1994 (DHS)	0.3	0.0

* Meaning 0.4 sterilizations per 100 ever-married women per year.

† Data refer to ages 15–44.

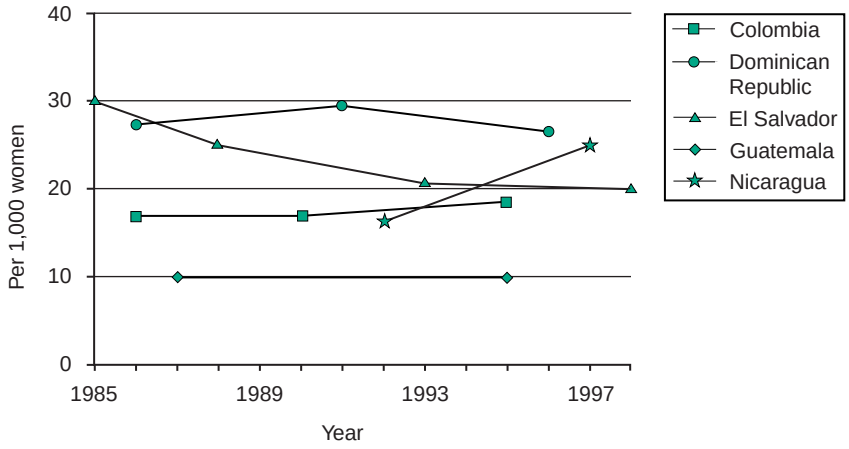
‡ Data are limited to Northeastern Brazil.

§ Excludes the West Bank.

‖ Data are not weighted.

Notes: md=missing data. Data included here were generated at the request of EngenderHealth by Measure-DHS+ and by the Division of Reproductive Health, CDC.

Figure 2.1. Five-year average incidence of female sterilization per 1,000 women of reproductive age who were ever in union, selected Latin American countries, 1985–1998



Incidence of female sterilization

Sterilization users (both new and continuing) are still overwhelmingly female (Ross, Hong, & Huber, 1985). (Chapters 1 and 5 explore some of the supply and demand issues that may explain the more widespread use and greater acceptance of female sterilization.)

As shown in Table 2.1, the highest average incidence rates are found in Latin America and Caribbean, where female sterilization has been the leading family planning method for decades. Brazil, the Dominican Republic, Nicaragua, Panama, and Puerto Rico all have female sterilization acceptance rates of 2–3% per year. Incidence is also high in El Salvador and Mexico (1.9%) and moderately high in several other Latin American countries. In these countries, interest in female sterilization is high, as is the availability of the method, thus contributing to relatively high incidence rates.

Over time, no trend is identifiable in the region's overall average incidence of female sterilization (Figure 2.1). Despite fluctuations, the rate in the Dominican Republic remained above 2.5%. Incidence still is fairly stable in Guatemala and has increased minimally in Colombia. In this region, the most dramatic changes have taken place in Nicaragua, where average rates have risen from 1.6% to 2.5%, and in El Salvador, where average incidence has declined steadily since 1985 (from 3.0% to 1.9%).

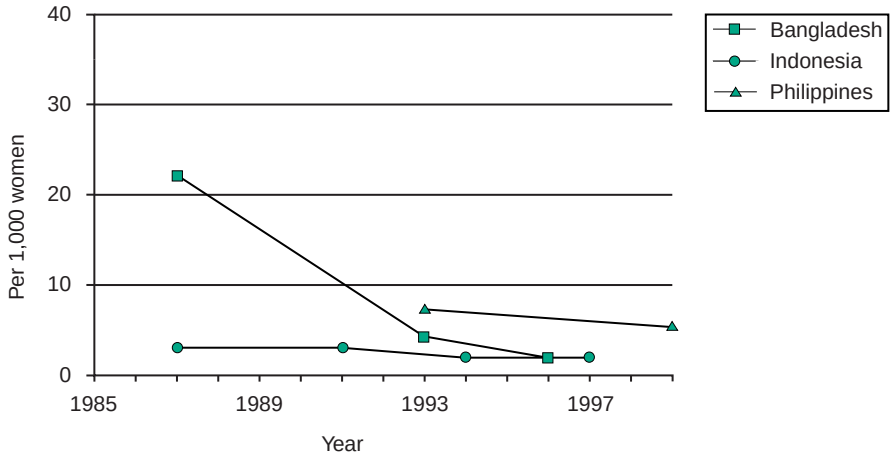
The approximate five-year average incidence of female sterilization in the United States, however, surpasses even rates found in Latin America and the Caribbean (Table 2.1). Although the U.S. rate has decreased since around 1988 (when it averaged 8.4% over a five-year period), the average 1995 rate of 6.5%[3] is higher than that of any other country. As in Latin America, the wide availability and historical popularity of female sterilization explain its high incidence in the United States.

Current incidence levels for parts of Asia and for Australia, Canada, and Western Europe are largely unavailable, but demographics, past history, and current prevalence levels (Supplement 2.5, page 55) suggest that Australia and many Western European countries may also have modest-to-high incidence levels of female sterilization (1–3%). For selected Asian countries for which data were available, Figure 2.2 suggests that incidence rates are falling in Bangladesh, Indonesia, and the Philippines.

In contrast to countries with moderate-to-high incidence of female sterilization, countries in Eastern Europe, the Middle East, and North Africa tend to have incidence rates of 0.5% or less. Historically, use of female sterilization has been rare in these regions because of the lack of available services, coupled in some cases with religious

[3] Data are from a special analysis by Anjani Chandra of 1995 NSFG data, National Center for Health Statistics, 2000.

Figure 2.2. Five-year average incidence of female sterilization per 1,000 women of reproductive age who were ever in union, selected Asian countries, 1985–1999



opposition to or legal restrictions on sterilization. In the Middle East and North Africa, only Jordan and Tunisia have estimated incidence rates of 0.5% or higher. In Central Asia and Eastern Europe, sterilization is much more rare than in neighboring countries to the west, but incidence is at measurable levels in Romania and Ukraine (0.1%).

Similarly, until relatively recently, few countries in Sub-Saharan Africa have made use of female sterilization. Incidence is highest in Cape Verde (1.4%), Mauritius (0.7%), Kenya and Swaziland (0.4%), Zimbabwe (0.3%), and Tanzania and Zambia (0.2%). Time trends indicate that over a five-year period, the average annual incidence has remained stable or has even decreased. Figure 2.3 presents trend data for four selected North African and Sub-Saharan African countries. Estimated annual incidence rates in Egypt, Morocco, and Tanzania have remained steady over a 10-year period, while Kenya had a large increase between 1989 and 1993 and then saw incidence level off. The increase in Kenya is attributable to program factors, mainly the introduction of minilaparotomy (Church & Geller, 1990). Despite the low incidence of female sterilization in Sub-Saharan Africa, sterilization prevalence is projected to rise in coming years in many of these countries (see Chapter 8), in part because of the future demographic momentum of the younger populations in Africa.

Figure 2.3. Five-year average incidence of female sterilization per 1,000 women of reproductive age who were ever in union, selected North African and Sub-Saharan African countries, 1985–1998

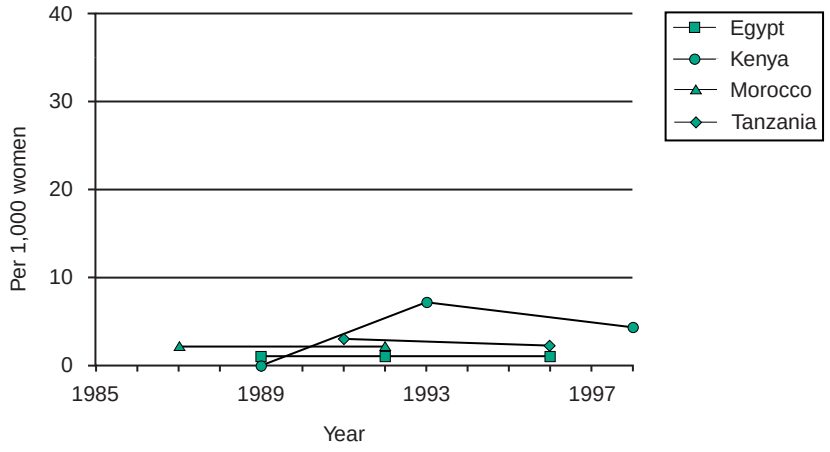
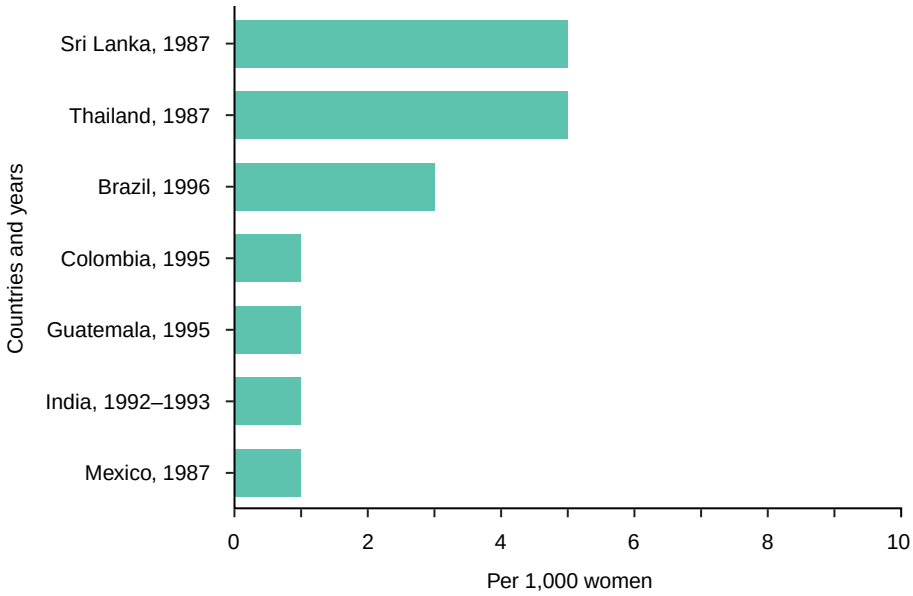


Figure 2.4. Five-year average incidence of male sterilization per 1,000 women of reproductive age who were ever in union, selected countries and years



Incidence of male sterilization

Data on the incidence of vasectomy are difficult to obtain, as vasectomy is neither widely available nor commonly used in many countries. However, while sterilization use is greatly weighted toward female sterilization, Ross, Hong, and Huber (1985) noted that "there are significant breaks in the pattern." Data for the past 15–20 years reveal that in some countries male sterilization contributes to overall prevalence and incidence levels for sterilization and represents an important family planning method.

As shown in Figure 2.4, moderately high estimates of vasectomy incidence are seen in Sri Lanka and Thailand (5 per 1,000 each) over the five years prior to 1987. These countries have a fairly well-developed family planning and sterilization program that includes vasectomy. In contrast, incidence in India remains low but measurable, at an estimated five-year average of 1 per 1,000 in 1992–1993. Acceptance of vasectomy has been less in Latin America: Brazil has the highest incidence in the region, an average of 3 per 1,000 for the five years prior to the most recent survey; Colombia, Guatemala, and Mexico average 1 per 1,000. Worldwide, little change has occurred over time in the average rate of vasectomy (Supplement 2.4), although in Bangladesh five-year incidence levels declined substantially.

Although vasectomy incidence data for China and the Republic of Korea were not available for this review, these countries have the highest vasectomy prevalence rates in Asia, and it is likely that vasectomy incidence is similarly high. Incidence data for Hong Kong also were not available, but prevalence data (Supplement 2.2) suggest that vasectomy is also popular there.

In the United States, estimates for 1991 and 1995 show vasectomy incidence to be relatively stable at 1.0% (or 10 per 1,000 men aged 25–49) (Magnani et al., 1999). In Canada, New Zealand, and the United Kingdom, where male sterilization's prevalence is quite high relative to other developed countries, vasectomy incidence is also likely to be very high.

Prevalence

Patterns of sterilization prevalence are similar to those of incidence. However, as noted earlier, data on prevalence represent the cumulative number of sterilization users, as a

proportion of the population of reproductive age currently in union. (Because these data are easier to obtain than are incidence data, we are able to present prevalence information for a much larger number of countries.)

The most recent data on the prevalence of sterilization (both female and male) show that levels are highest in Asia, Latin America and the Caribbean, North America, Oceania, and selected countries in Western Europe (Supplement 2.5). Where sterilization prevalence is relatively high, between one-fourth and one-half of all couples use the method. The countries and territories where the prevalence of female and male sterilization is highest (Table 2.2) include Puerto Rico (49%), the Republic of Korea (47%), Canada and China (46%), Brazil (43%), the Dominican Republic (41%), the United States (39%), Australia (38%), Panama (34%), and New Zealand (33%).

In much of Africa and the Middle East and in parts of Eastern Europe, the prevalence of both female and male sterilization is far lower (less than 2%). The biggest exception is South Africa (at 18%). In addition, nations such as Botswana, Cape Verde, Kenya, Mauritius, Namibia, and Swaziland now have sterilization prevalence rates of 5% or higher. The introduction of minilaparotomy services into family planning programs in Sub-Saharan Africa may account for some of this increase in use (Church & Geller, 1990).

Four factors that affect prevalence are age at sterilization, the historical availability of sterilization in a country, incidence rates, and continuation (Ross, 1992; Rutenberg & Landry, 1993). Many countries with high prevalence are generally characterized as having more established sterilization programs (Rutenberg & Landry, 1993). In comparison, those with lower prevalence—for example, countries in Africa, Eastern Europe,

Table 2.2. Twenty countries with the highest total sterilization prevalence (female and male) among women who are married or in union, by country and year of survey

Country/date	Prevalence (%)
Puerto Rico, 1995–1996	48.7
Korea, Republic of, 1991	47.3
China, 1992	46.1
Canada, 1995	46.0
Brazil, 1996	42.7
Dominican Republic, 1996	41.0
United States, 1995	38.7
Australia, 1986	38.1
Panama, 1984	33.5
New Zealand, 1995	33.0
El Salvador, 1998	32.4
United Kingdom, 1993	32.0
India, 1992–1993	30.7
Mexico, 1995	27.3
Sri Lanka, 1993	27.2
Nicaragua, 1998	26.6
Colombia, 1995	26.4
Hong Kong, 1987	23.8
Thailand, 1993	22.6
Ecuador, 1999	22.5

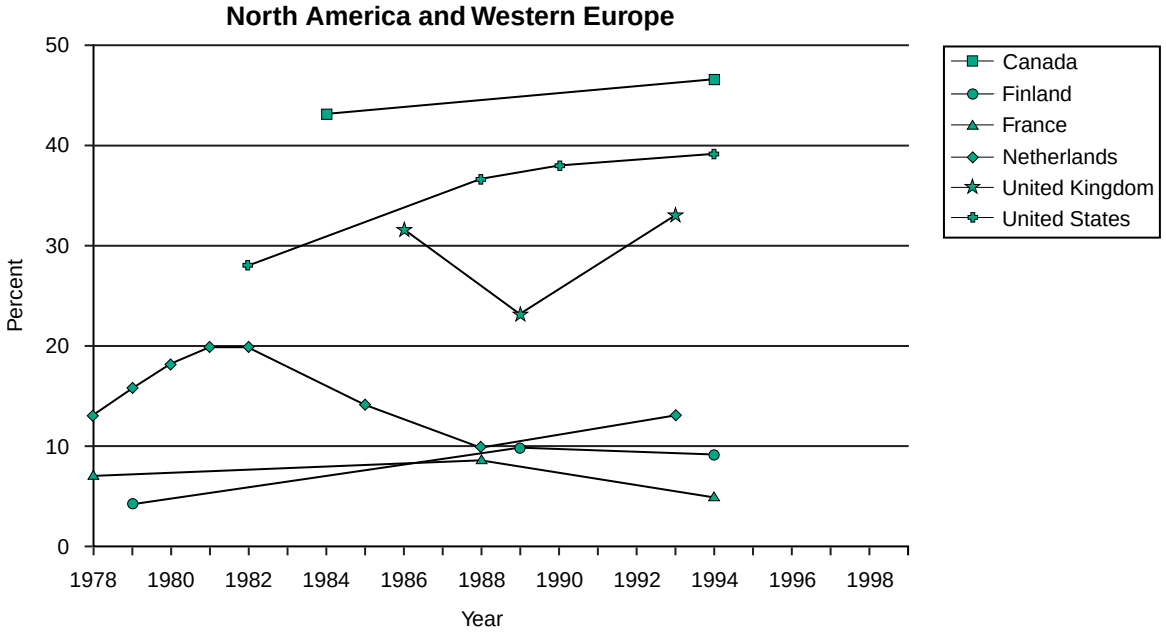
and the Middle East—tend to have newer programs, and legal restrictions may bar establishment of formal sterilization programs (see Chapter 4).

Another factor that may result in differences in prevalence is age at sterilization. In much of Latin America, women who choose sterilization do so at younger ages than women in Africa (see Chapter 3). As noted above, Asia and Latin America are also regions with comparatively high sterilization incidence, which contributes to high prevalence. Lastly, methodologies used in designing surveys in developed and developing countries may also influence reported rates; surveys conducted in developing countries tend to include women aged 45–49, whereas in developed countries the upper cutoff is usually set at age 44 (UN Population Division, 1999).

In 1985, Ross, Huber, and Hong examined survey data on sterilization for a previous 10-year period and reported a "rapid, historic, and unprecedented movement toward permanent contraception, in a diversity of settings." They identified Asia and Latin America as regions with high levels of sterilization prevalence. Puerto Rico and the United States had the highest levels (46% and 39%, respectively, including hysterectomies), followed by Panama (30%), the Republic of Korea (28%), China (25%), and Thailand (23%). Costa Rica, the Dominican Republic, El Salvador, Hong Kong, India, Singapore, Sri Lanka, and Taiwan had high rates, ranging from 18% to 22%. In Western Europe, the highest levels of sterilization prevalence stood at 20% in the Netherlands and 16% in England and Wales combined.

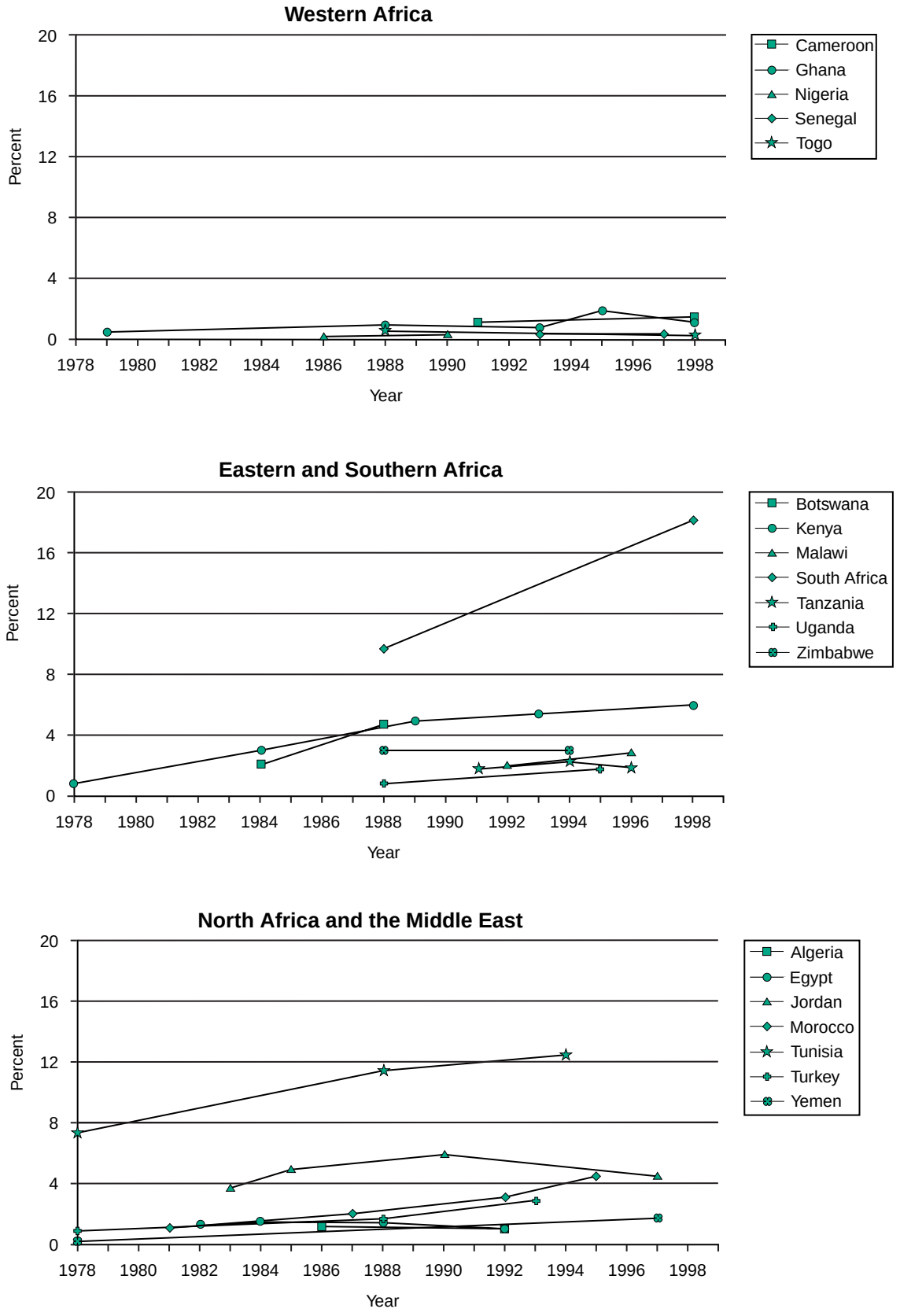
Many regional patterns noted in 1985 have remained the same. Asia, Latin America, and parts of North America and Western Europe still have some of the highest prevalence. In fact, since 1985, sterilization prevalence has continued to grow in many of the countries (Figure 2.5). The largest increases have taken place in Brazil and the Dominican Republic. In these countries, as well as in Colombia, Mexico, and Nicaragua, prevalence has increased by at least eight percentage points within a 10-year period. For the most part, these five countries are characterized by high acceptance rates and young age at sterilization (less than 30), which may contribute to these changes. Rates have also increased in China, where prevalence now stands at 46%. High acceptance rates (in China's case, a product of its one-child policy) and decreasing age at sterilization in most of these countries may explain these trends.

Figure 2.5. Total prevalence of sterilization among women of reproductive age who were ever in union, selected countries, 1978–1999



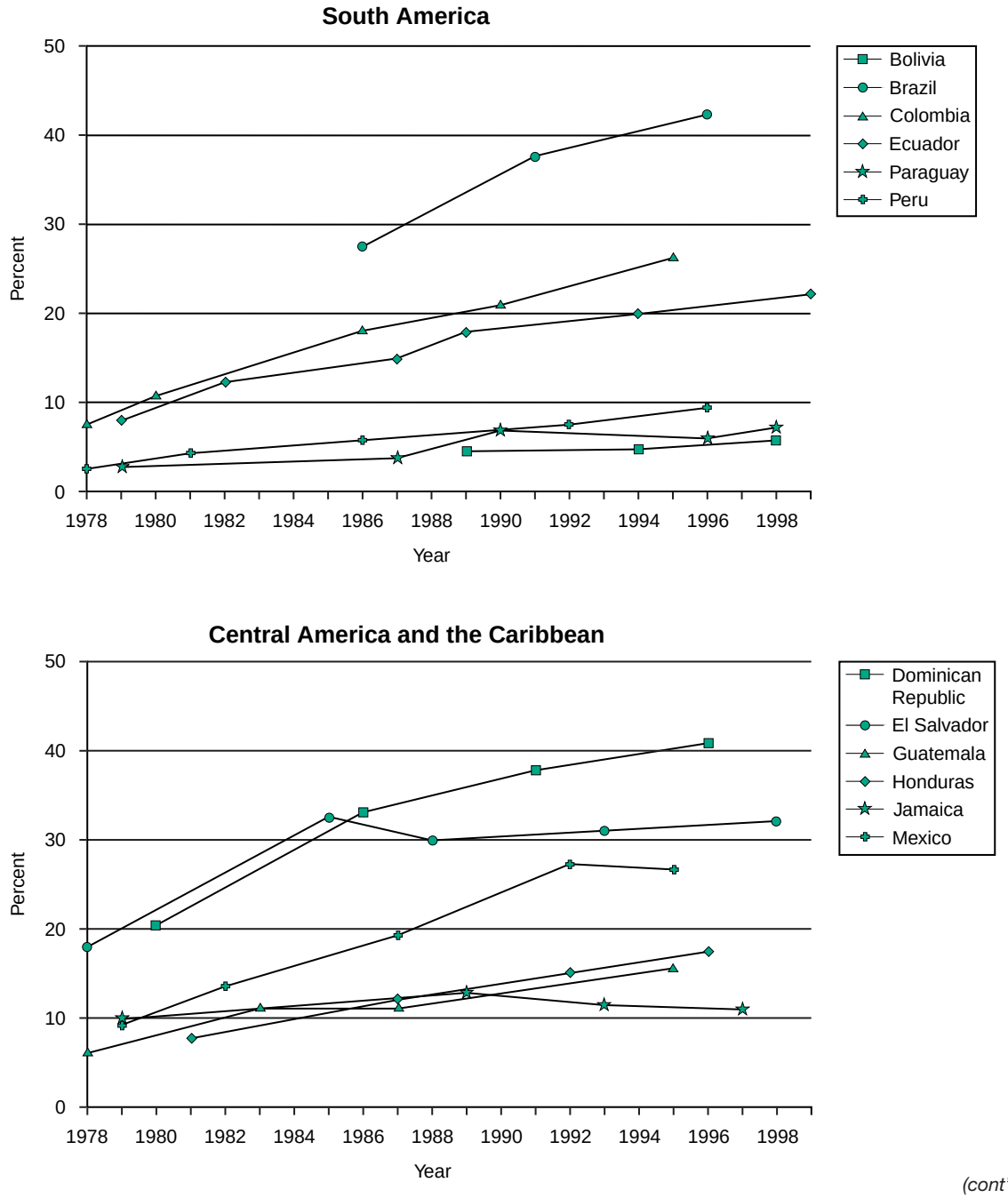
(cont'd.)

Figure 2.5. Total prevalence of sterilization among women of reproductive age who were ever in union, selected countries, 1978–1999 ***(cont'd.)***



(cont'd.)

Figure 2.5. Total prevalence of sterilization among women of reproductive age who were ever in union, selected countries, 1978–1999 ***(cont'd.)***

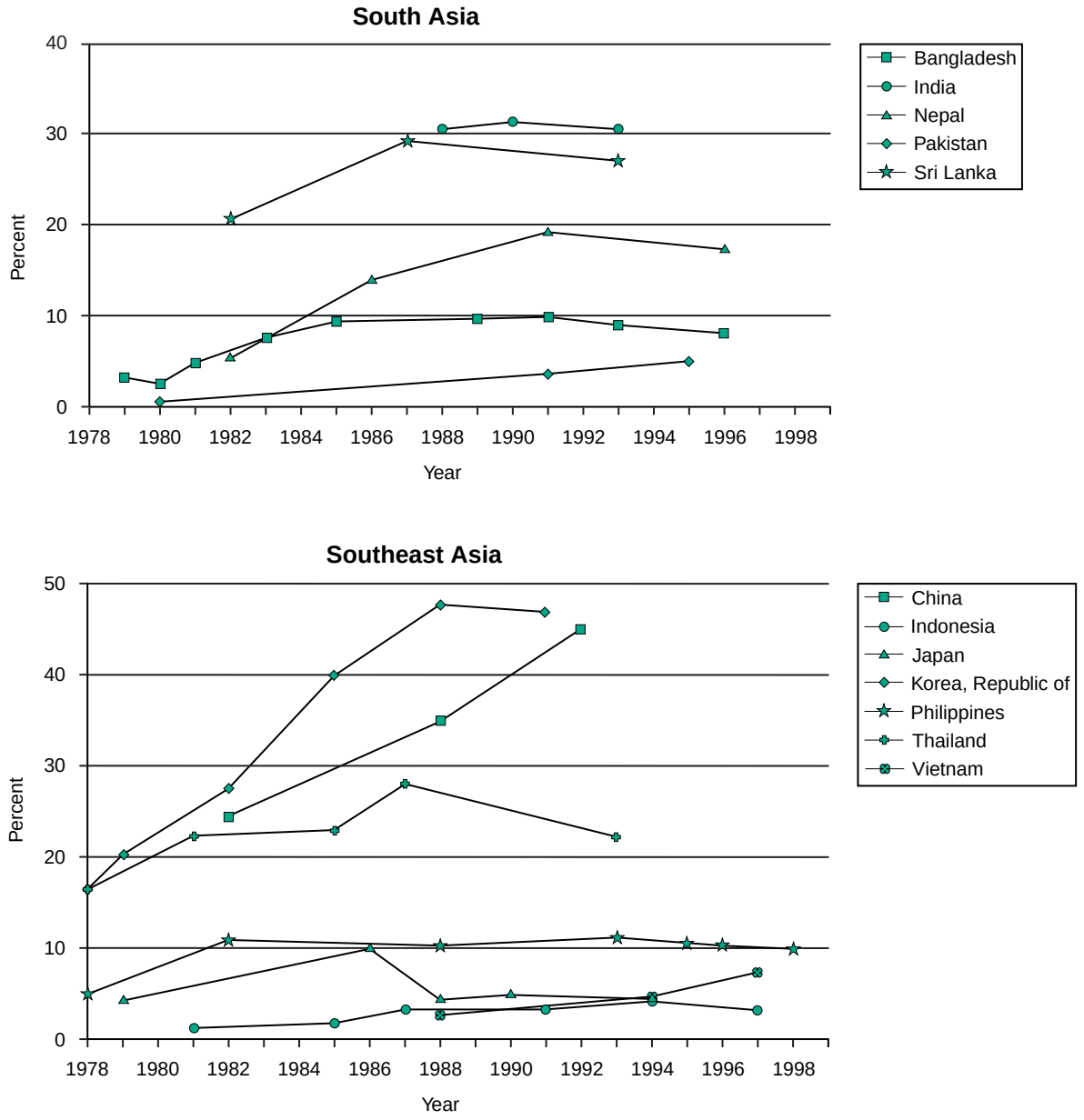


(cont'd.)

Smaller increases can be observed in a number of North African and Sub-Saharan African nations: In Kenya, Malawi, Mauritius, Morocco, Namibia, Tunisia, and Uganda, increases ranged from 0.5 to five percentage points between about 1985 and 1998. Lower acceptance of sterilization, older age at sterilization, and less-established programs are some characteristics associated with lower sterilization use in many of these countries.

Sterilization prevalence has also decreased in a number of countries. The largest occurred in Japan (about six percentage points) over an eight-year period. Low acceptance, brought on by restrictive policies for sterilization, high reliance on abortion, high re-

Figure 2.5. Total prevalence of sterilization among women of reproductive age who were ever in union, selected countries, 1978–1999 ***(cont'd.)***



liance on condoms, and an aging population may explain low and declining sterilization prevalence in Japan (Turner, 1993). Slight decreases (of 1–2 percentage points) in total sterilization prevalence have taken place in Jamaica, the Philippines, and Sri Lanka. Such decreases suggest that couples are using sterilization less and other family planning methods more. Declines have also been noted in Finland (0.4 percentage points) and in France (3.8 percentage points). In Bangladesh, Ghana, and the Philippines, sterilization prevalence has fluctuated, in some cases falling back to levels that are similar to or slightly higher than those of the early 1980s. In Bangladesh, a rise in overall contraceptive prevalence relative to the decrease in sterilization prevalence suggests greater use of alternative family planning methods. After sterilization prevalence increased sharply in India, as a result of aggressive governmental campaigns (from 21% to 31% over a six-year period), it has now settled at roughly 31%.

Prevalence of female sterilization

The prevalence of female sterilization is highest in Latin America and parts of Asia. Puerto Rico, the Dominican Republic, and Brazil have the highest rates anywhere, at 45%, 41%, and 40%, respectively (Table 2.3). Moreover, because the prevalence of male sterilization is extremely low in these countries, their high levels of overall sterilization prevalence are usually a direct product of high levels of female sterilization. High acceptance rates, a comparatively low age at sterilization, and the broad availability of services all contribute to the high prevalence of female sterilization. These factors tend to be less common in parts of Africa, Eastern Europe, and the Middle East, where sterilization prevalence is lower. Other countries with comparatively high levels of female sterilization include China (36%), the Republic of Korea (35%), Panama (33%), and El Salvador (32%). (No recent information is available on the prevalence of female sterilization in Mexico; however, given relatively high past levels of sterilization and overall low use of vasectomy, we infer that female sterilization prevalence is higher than 25% there.)

Because female sterilization contributes greatly to overall sterilization prevalence in many countries, it mirrors many of the changes that have occurred in overall prevalence. For example, female sterilization has grown mostly in China and Latin America, with smaller increases noted throughout Africa. Use of female sterilization has increased in Australia, Belgium, New Zealand, Norway, and the United States, often by 5–10 percentage points; however, compared with trends in Latin America, these increases have occurred less rapidly. In their review of sterilization data in Scotland, Hunt and Annan-

Table 2.3. Twenty countries with the highest prevalence of female sterilization among women who are married or in union, by country and year of survey

Country/date	Prevalence (%)
Puerto Rico, 1995–1996	45.2
Dominican Republic, 1996	40.9
Brazil, 1996	40.1
China, 1992	35.9
Korea, Republic of, 1991	35.3
Panama, 1984	33.1
El Salvador, 1998	32.4
Canada, 1995	29.8
Australia, 1986	27.7
India, 1992–1993	27.3
Mexico, 1995*	27.3
Nicaragua, 1998	26.1
Colombia, 1995	25.7
United States, 1995	23.8
Sri Lanka, 1993	23.5
Hong Kong, 1987	22.9
Ecuador, 1999	22.5
Cuba, 1987	22.0
Costa Rica, 1993	20.0
Thailand, 1993	19.8

* Prevalence data are not available by type of sterilization (male vs. female). We assume that the prevalence of male sterilization is 1% or less.

dale (1990) speculated that concern over hormonal methods, coupled with a low tolerance for contraceptive failure and prior unsatisfactory experiences with contraceptive methods, led to higher acceptance and use of sterilization. The same may be true in some other developed countries.

Decreases in the prevalence of female sterilization have also been observed in a few other countries, such as in Bangladesh, France, India, Japan, the Republic of Korea, and Thailand. Reasons for these changes may include greater interest in alternative methods (in Bangladesh, the Republic of Korea, and Thailand), changes in government policies or incentive programs (Bangladesh and India), and aging populations (France and Japan).

Prevalence of male sterilization

The prevalence of male sterilization is highest in parts of Asia, North America, Oceania, and Western Europe. Specifically, Canada, New Zealand, the United Kingdom, and the United States have the highest rates, ranging from about 15% to 18% (Table 2.4). China and the Republic of Korea have the highest levels in Asia, at 10% and 12%, respectively. Most of these countries are characterized as having well developed sterilization programs, including programs for vasectomy. In much of Africa, Eastern Europe, and Latin America, male sterilization rarely exceeds 1%.

Figure 2.6 (page 33) illustrates that the level of male sterilization is lower than that of female sterilization in all countries except the United Kingdom (18% vs. 14%), the Netherlands (9% vs. 4%), Bhutan (8% vs. 3%), and New Zealand (18% vs. 15%). Ross et al. (1985) suggest that the improved surgical technology of the female sterilization procedure and the lack of institutional motivation to establish programs for men explain

Table 2.4. Twenty countries with the highest prevalence of male sterilization among women who are married or in union, by country and year of survey

Country/date	Prevalence (%)
New Zealand, 1995	18.0
United Kingdom, 1993	18.0
Canada, 1995	16.2
United States, 1995	14.9
Korea, Republic of, 1991	12.0
Australia, 1986	10.4
China, 1992	10.2
Netherlands, 1993	9.0
Switzerland, 1995	8.3
Bhutan, 1994	8.0
Nepal, 1996	5.4
Denmark, 1988	5.0
Norway, 1988–1989	4.3
Sri Lanka, 1993	3.7
Puerto Rico, 1995–1996	3.5
India, 1992–1993	3.4
Thailand, 1993	2.8
Brazil, 1996	2.6
Guatemala, 1995	1.5
Bangladesh, 1996–1997	1.1

low acceptance rates for vasectomy. In addition, gender differences in sterilization prevalence may also be attributed to antipathy and poor information about vasectomy. (Further discussions of these factors can be found in Chapters 1 and 5.)

Since the late 1970s and early 1980s, male sterilization prevalence has grown in Belgium, Canada, China, Norway, the Republic of Korea, and the United States.[4] Minor fluctuations also have been noted in much of Asia.

Use of male sterilization has also increased, albeit by smaller increments, in countries such as Brazil, Colombia, and Guatemala. Educational and mass media promotional campaigns in these and other countries have established the existence of a market for vasectomy (Atkins & Jezowski, 1983; Liskin, Benoit, & Blackburn, 1992; Lynam et al., 1993; Vernon, 1996). Experience has shown that where providers and the media have promoted vasectomy and where quality services are made available, clients are drawn to services and use increases (Bertrand et al., 1987; Haws et al., 1997; Kincaid et al., 1996; Kiragu et al., 1995; Landry & Ward, 1997; Muhondwa & Rutenberg, 1997). In addition, overall numbers have been low in most areas because of what are termed "provider determinants," such as the reluctance of national programs to establish widespread male services and to publicize them adequately (Kiragu et al., 1995; Ross et al., 1985), and the negative attitudes of individual providers toward vasectomy provision (Landry & Ward, 1997; Wilkinson et al., 1996).

Current Numbers of Users

Most of the world's sterilization users are found in Asia (Figure 2.7, page 34), particularly China and India. Combined, China and India account for nearly 75% of the world's total users (not shown). In comparison, Africa and the Middle East have about 2.2 million and 1.5 million sterilization users, respectively, or 1.6% of all users worldwide. Supplement 2.2 lists the number of sterilization users by country.

It should come as no surprise that China and India account for the highest number of sterilization users: Both countries have large overall populations and relatively high sterilization prevalence (46% and 31%, respectively), producing a powerful combined effect on the numbers of users (Table 2.5, page 34). Countries and territories such as the Republic of Korea and Puerto Rico have higher total prevalence levels (47% and 49%, respectively) than China and India, but the overall number of women in union in these areas is considerably lower. As a result, the numbers of sterilization users in both represent little more than 2% of the worldwide estimate. In Africa and the Near East, the small number of sterilization users can be attributed primarily to the low prevalence of sterilization.

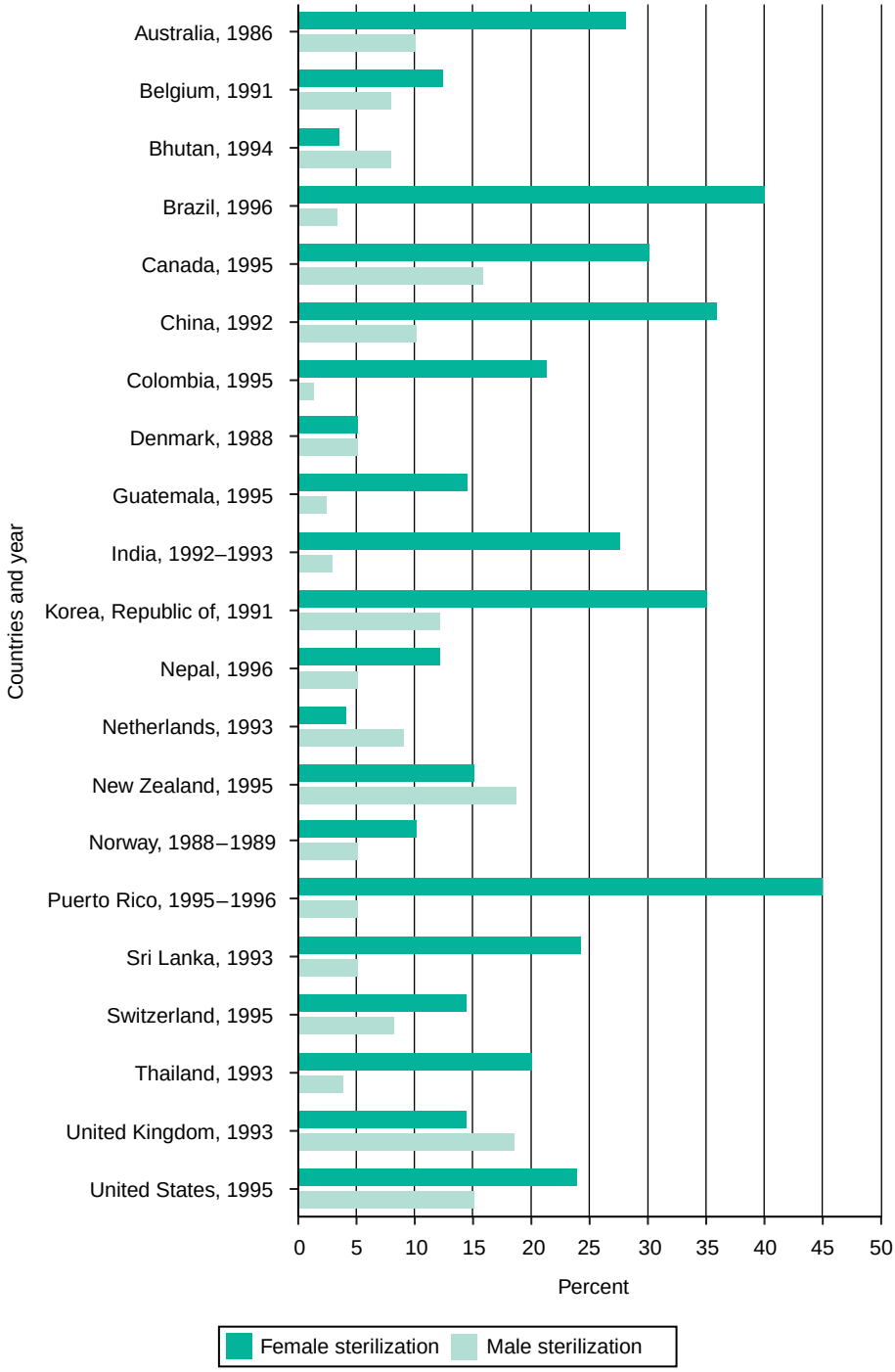
With few exceptions, the number of sterilization users has increased across countries since the 1985 review. Such increases have been especially marked in Brazil, China, and Colombia, where the number of current users is about six, three, and four times greater, respectively, than levels noted in the 1980s; in general, increases in other countries have been relatively less sizable. As previously mentioned, the rising prevalence of sterilization may account in part for these increases, but the overall populations of these countries also appear to have grown considerably, with an ever more youthful population structure (Merrick, 1994). In comparison, decreases have been noted in a few countries in Africa (Côte d'Ivoire and Ghana) and Europe (Denmark and France).

Number of female sterilization users

In general, users of female sterilization outnumber users of male sterilization. Worldwide totals show approximately 180 million female sterilization users and almost 43

[4] In these six countries, vasectomy prevalence prior to 1985 was 0.0% in Belgium (1976), 8.7% in Canada (1984), 6.9% in China (1982), 1.7% in Norway (1977), 5.2% in the Republic of Korea (1982), and 10.4% in the United States (1982) (Ross et al., 1985).

Figure 2.6. Prevalence of female sterilization and male sterilization, selected countries, 1986–1996



million male sterilization users, a ratio of about four to one. Asia has the most users of female sterilization (147 million, or 82% of the world's total); most are concentrated in China (86 million) and India (48 million). Latin America and the Caribbean has the second-highest number of female sterilization users (about 15 million), followed by North America (excluding Mexico) and Western Europe combined, with 13 million; these two regions represent about 8% and 7% of the world's total, respectively.

Figure 2.7. Percentage distribution of sterilization users, by region

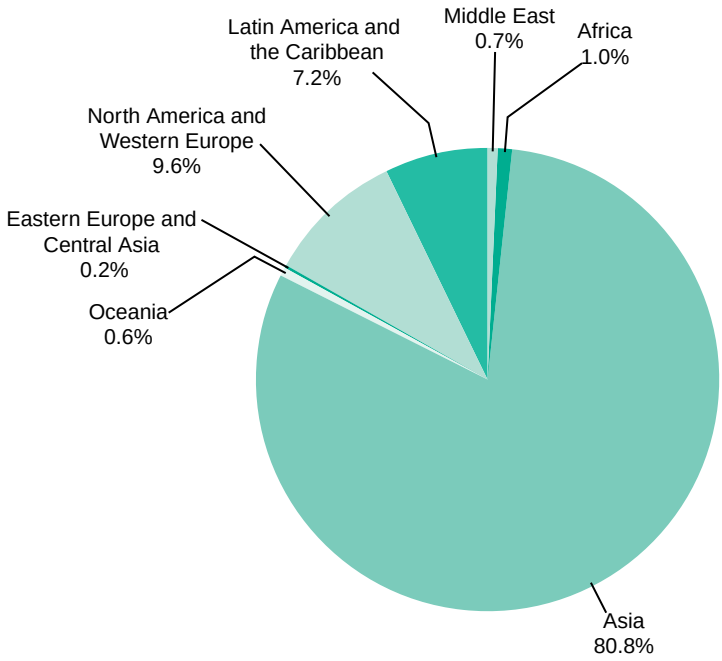


Table 2.5. Twenty countries with the highest total prevalence of sterilization and 20 countries with the highest total number of sterilization users, by country and year of survey

Prevalence	%	Users	No. (in millions)*
Puerto Rico, 1995–1996	48.7	China, 1992	110.13
Korea, Republic of, 1991	47.3	India, 1992–1993	54.49
China, 1992	46.1	United States, 1995	14.44
Canada, 1995	46.0	Brazil, 1996	11.44
Brazil, 1996	42.7	Korea, Republic of, 1991	3.78
Dominican Republic, 1996	41.0	United Kingdom, 1993	2.98
United States, 1995	38.7	Thailand, 1993	2.24
Australia, 1986	38.1	Canada, 1995	2.12
Panama, 1984	33.5	Bangladesh, 1996–1997	1.94
New Zealand, 1995	33.0	Colombia, 1995	1.37
El Salvador, 1998	32.4	Indonesia, 1997	1.19
United Kingdom, 1993	32.0	Philippines, 1998	1.11
India, 1992–1993	30.7	Pakistan, 1994–1995	1.07
Mexico, 1995	27.3	Australia, 1986	1.03
Sri Lanka, 1993	27.2	Iran, 1992	0.95
Nicaragua, 1998	26.6	South Africa, 1998	0.86
Colombia, 1995	26.4	Sri Lanka, 1993	0.79
Hong Kong, 1987	23.8	Vietnam, 1997	0.78
Thailand, 1993	22.6	Japan, 1994	0.75
Ecuador, 1999	22.5	Nepal, 1996	0.70

* Number of users is calculated by multiplying sterilization prevalence (obtained through reproductive health surveys) by the number of women in union (obtained from United Nations surveys).

Table 2.6. Relationship between levels of contraceptive prevalence and sterilization prevalence, and country examples

Contraceptive prevalence	Sterilization prevalence	Sterilization prevalence as a % of contraceptive prevalence	Country examples
Low	Low	Low	Bolivia, Uganda
Low	High	High	Guatemala, Nepal
High	Low	Low	France, Vietnam
High	High	High	Brazil, Dominican Republic

Number of male sterilization users

With regard to numbers, male sterilization users appear to be concentrated in Asia, North America, Oceania, and Western Europe. Because of the many vasectomy users in China (24 million), Asia accounts for 77% of all male sterilization users worldwide. Combined, North America, Oceania, and Western Europe contribute about 20% of vasectomy users.

Sterilization's Share of Contraceptive Prevalence

Supplement 2.5 displays information on sterilization as a percentage of all contraceptive prevalence. This measure represents the degree to which permanent methods contribute to all family planning use in a country. Table 2.6 summarizes the different scenarios that have occurred with regard to this percentage, with some country examples.

In developing countries, longer-acting and highly effective clinic methods, such as female sterilization and the IUD, generally account for much of the method mix, a pattern very unlike that seen in more developed areas (UN Population Division, 1999).

Where total contraceptive use is high but sterilization prevalence is low, sterilization's share of the total is low (Table 2.6), showing that most people rely on family planning methods besides vasectomy and female sterilization. In France, for instance, contraceptive prevalence is 75%, but sterilization represents only a fraction of that total prevalence level, because most users rely instead on oral contraceptives (de Guilbert-Lantoine & Leridon, 1998).

In comparison, contraceptive users in countries such as Brazil and the Dominican Republic rely heavily on sterilization. In these countries, contraceptive prevalence is high (50% to 75%), and sterilization represents anywhere from 50% to 64% of the total. Where the sterilization percentage is high but the total is low, what little contraceptive use exists clearly consists mainly of sterilization. Bhutan, Guatemala, and Nepal are examples of countries in which overall contraceptive prevalence is comparatively low (less than 30%), but sterilization's share of prevalence is relatively high. The lack of availability of alternative methods and method preference are two factors that help explain this scenario.

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Supplement 2.1. Number (in millions) of women of reproductive age currently in union who are using sterilization, by type of sterilization, according to region

Region	Total	Male sterilization	Female sterilization
Worldwide	**222.359**	**42.580**	**179.779**
Asia	179.661	32.702	146.959
Oceania	1.248	0.372	0.876
Latin America and the Caribbean	15.999	0.793	15.206
North America and Western Europe	21.414	8.497	12.917
Eastern Europe and Central Asia	0.372	0.000	0.372
Middle East	1.482	0.104	1.378
Africa	2.183	0.112	2.071

Supplement 2.2. Percentage and number of women of reproductive age currently in union who are using sterilization, by type of sterilization, according to region and country

Country/year	Source	% using sterilization			No. of women in union* (in millions)	Total no. of users† (in millions)	No. of couples using male sterilization (in millions)	No. of couples using female sterilization (in millions)	Notes
		Total	Male	Female					
Asia						**179.865**	**32.702**	**146.959**	
Bangladesh, 1996–1997	DHS	8.7	1.1	7.6	22.3	1.940	0.245	1.695	1
Bhutan, 1994	UN/ESA	11.1	8.0	3.1	0.3	0.033	0.024	0.009	2
China, 1992	CDC	46.1	10.2	35.9	238.9	110.133	24.368	85.765	
Hong Kong, 1987	WP/98 Survey	23.8	0.9	22.9	1.0	0.238	0.009	0.229	
India, 1992–1993	DHS	30.7	3.4	27.3	177.5	54.493	6.035	48.458	3
Indonesia, 1997	DHS	3.4	0.4	3.0	34.9	1.187	0.140	1.047	
Japan, 1994	UN/ESA	4.1	0.7	3.4	18.4	0.754	0.129	0.626	
Korea, Republic of, 1991	UN/ESA	47.3	12.0	35.3	8.0	3.784	0.960	2.824	4
Lao People's Democratic Republic, 1993	UN/ESA	5.1	NA	5.1	0.7	0.036	NA	0.036	
Malaysia, 1988	UN/ESA	6.8	NA	NA	3.0	0.204	NA	NA	5
Mongolia, 1994	UN/ESA	0.9	0.3	0.6	0.4	0.004	0.001	0.002	
Myanmar, 1992	UN/ESA	5.5	1.8	3.7	6.8	0.374	0.122	0.252	
Nepal, 1996	DHS	17.5	5.4	12.1	4.0	0.700	0.216	0.484	
Pakistan, 1994–1995	UN/ESA	5.0	Z	5.0	21.3	1.065	NA	1.065	
Philippines, 1998	DHS	10.4	0.1	10.3	10.7	1.113	0.011	1.102	
Sri Lanka, 1993	UN/ESA	27.2	3.7	23.5	2.9	0.789	0.107	0.682	6
Thailand, 1993	UN/ESA	22.6	2.8	19.8	9.9	2.237	0.277	1.960	4
Vietnam, 1997	DHS	6.8	0.5	6.3	11.5	0.782	0.058	0.725	
Oceania						**1.248**	**0.372**	**0.876**	
Australia, 1986	WP/98 Survey	38.1	10.4	27.7	2.7	1.029	0.281	0.748	7
New Zealand, 1995	UN/ESA	33.0	18.0	15.0	0.5	0.165	0.090	0.075	7, 8
Papua New Guinea, 1996	UN/ESA	7.8	0.2	7.6	0.7	0.055	0.001	0.053	

(cont'd.)

Supplement 2.2. Percentage and number of women of reproductive age currently in union who are using sterilization, by type of sterilization, according to region and country *(cont'd.)*

Country/year	Source	% using sterilization			No. of women in union* (in millions)	Total no. of users† (in millions)	No. of couples using male sterilization (in millions)	No. of couples using female sterilization (in millions)	Notes
		Total	Male	Female					
Latin America and the Caribbean						**16.158**	**0.793**	**15.206**	
Antigua and Barbuda, 1988	WP/98 CPS	11.0	NA	11.0	NA	NA	NA	NA	4
Bahamas, 1988	WP/98 CPS	17.2	NA	17.2	NA	NA	NA	NA	4
Barbados, 1988	UN/ESA	10.7	0.3	10.4	NA	NA	NA	NA	
Belize, 1991	CDC	18.7	NA	18.7	NA	NA	NA	NA	4
Bolivia, 1998	DHS	6.5	Z	6.5	1.1	0.072	NA	0.072	
Brazil, 1996	DHS	42.7	2.6	40.1	26.8	11.444	0.697	10.747	
Colombia, 1995	DHS	26.4	0.7	25.7	5.2	1.373	0.036	1.336	
Costa Rica, 1993	CDC	21.0	1.3	19.7	0.5	0.105	0.007	0.099	
Cuba, 1987	UN/ESA	22.0	NA	22.0	1.9	0.418	NA	0.418	
Dominica, 1987	UN/ESA	12.6	NA	12.6	NA	NA	NA	NA	4
Dominican Republic, 1996	DHS	41.0	0.1	40.9	1.1	0.451	0.001	0.450	
Ecuador, 1999	CDC	22.5	NA	22.5	1.9	0.428	NA	0.428	
El Salvador, 1998	CDC	32.4	NA	32.4	0.9	0.292	NA	0.292	4, 9
Guatemala, 1995	DHS	15.8	1.5	14.3	1.5	0.237	0.023	0.215	
Haiti, 1994–1995	DHS	3.1	NA	3.1	1.1	0.034	NA	0.034	
Honduras, 1996	CDC	18.1	NA	18.1	0.8	0.145	NA	0.145	4
Jamaica, 1997	CDC	12.3	NA	12.3	0.5	0.062	NA	0.062	
Mexico, 1995	UN/ESA	27.3	NA	NA	14.6	0.160	NA	NA	8
Nicaragua, 1998	DHS	26.6	0.5	26.1	0.6	0.160	0.003	0.157	
Panama, 1984	CDC	33.5	0.4	33.1	0.4	0.134	0.002	0.132	4
Paraguay, 1998	CDC	8.0	Z	8.0	0.7	0.056	NA	0.056	4
Peru, 1996	DHS	9.7	0.2	9.5	3.4	0.330	0.007	0.323	
Puerto Rico, 1995–1996	CDC	48.7	3.5	45.2	0.5	0.244	0.018	0.226	
Saint Lucia, 1988	WP/98 CPS	8.6	Z	8.6	NA	NA	NA	NA	4
Saint Vincent and the Grenadines, 1988	WP/98 CPS	13.1	Z	13.1	NA	NA	NA	NA	4
Trinidad and Tobago, 1987	DHS	8.4	0.2	8.2	0.2	0.017	0.000	0.016	
North America						**16.551**	**6.303**	**10.248**	
Canada, 1995	UN/ESA	46.0	16.2	29.8	4.6	2.116	0.745	1.371	8
United States, 1995	VHS	38.7	14.9	23.8	37.3	14.435	5.558	8.877	4
Western Europe						**4.863**	**2.194**	**2.669**	
Belgium, 1991	UN/ESA	19.1	7.6	11.5	1.7	0.325	0.129	0.196	10, 11, 12
Denmark, 1988	UN/ESA	10.0	5.0	5.0	0.7	0.070	0.035	0.035	4, 13

(cont'd.)

Supplement 2.2. Percentage and number of women of reproductive age currently in union who are using sterilization, by type of sterilization, according to region and country *(cont'd.)*

Country/year	Source	% using sterilization			No. of women in union* (in millions)	Total no. of users† (in millions)	No. of couples using male sterilization (in millions)	No. of couples using female sterilization (in millions)	Notes
		Total	Male	Female					
Western Europe *(cont'd.)*									
Finland, 1994	WP/98 Survey	9.3	1.0	8.3	0.7	0.065	0.007	0.058	14
France, 1994	WP/98 Survey	4.9	0.3	4.6	8.8	0.431	0.026	0.405	
Germany, 1992	UN/ESA	0.9	NA	0.9	12.0	0.108	NA	0.108	15
Netherlands, 1993	WP/98 Survey	13.0	9.0	4.0	2.2	0.286	0.198	0.088	16
Norway, 1988–1989	WP/98 Survey	14.7	4.3	10.4	0.5	0.074	0.022	0.052	17
Spain, 1985	UN/ESA	4.6	0.3	4.3	6.7	0.308	0.020	0.288	18
Switzerland, 1995	WP/98 Survey	22.0	8.3	13.7	1.0	0.220	0.083	0.137	7, 19
United Kingdom, 1993	UN/ESA	32.0	18.0	14.0	9.3	2.976	1.674	1.302	20, 21
Eastern Europe and Central Asia						**0.487**	**0.000**	**0.372**	
Azerbaijan, 2001	CDC	1.2	Z	1.2	1.0	0.012	NA	0.012	4
Belarus, 1995	UN/ESA	0.8	Z	0.8	1.8	0.014	NA	NA	22
Czech Republic, 1993	CDC	2.7	NA	2.7	1.9	0.051	NA	0.051	4
Georgia, 1999	CDC	1.6	Z	1.6	0.7	0.012	0.000	0.012	
Hungary, 1993	WP/98 Survey	5.1	NA	NA	1.8	0.092	NA	NA	23
Kazakhstan, 1995	DHS	0.7	NA	0.7	3.0	0.021	NA	0.021	
Kyrgyz Republic, 1997	DHS	1.8	NA	1.8	NA	NA	NA	NA	
Latvia, 1995	WP/98 Survey	2.1	NA	NA	0.4	0.008	NA	NA	18
Moldova, 1997	CDC	3.4	NA	3.4	0.8	0.027	NA	0.027	2
Romania, 1999	CDC	2.5	Z	2.5	3.2	0.080	0.000	0.080	
Russia, 1996	CDC	2.0	NA	2.0	NA	NA	NA	NA	4, 24
Slovakia, 1991	WP/98 UN	4.0	Z	4.0	1.0	0.040	NA	0.040	4, 13
Slovenia, 1989	WP/98 Survey	0.2	NA	NA	NA	NA	NA	NA	4
Ukraine, 1999	CDC	1.4	Z	1.4	7.3	0.102	0.000	0.102	
Uzbekistan, 1996	DHS	0.7	NA	0.7	3.8	0.027	NA	0.027	
Middle East						**1.482**	**0.104**	**1.378**	
Bahrain, 1995	UN/ESA	7.1	1.1	6.0	0.1	0.007	0.001	0.006	8, 25
Iran, 1992	UN/ESA	8.5	0.9	7.6	11.2	0.952	0.101	0.851	4
Iraq, 1989	UN/ESA	1.4	NA	1.4	2.8	0.039	NA	0.039	25
Jordan, 1997	DHS	4.2	NA	4.2	0.7	0.029	NA	0.029	
Kuwait, 1987	UN/ESA	2.0	NA	2.0	0.3	0.006	NA	0.006	25, 26
Lebanon, 1996	WP/98 PAPCHILD	4.2	NA	4.2	0.5	0.021	NA	0.021	
Oman, 1995	UN/ESA	4.5	Z	4.5	0.3	0.014	NA	0.014	8, 25
Qatar, 1987	UN/ESA	4.5	NA	4.5	0.1	0.005	NA	0.005	26
Syria, 1993	WP/98 PAPCHILD	2.2	Z	2.2	2.1	0.046	NA	0.046	
Turkey, 1993	DHS	2.9	Z	2.9	11.1	0.322	NA	0.322	

(cont'd.)

Supplement 2.2. Percentage and number of women of reproductive age currently in union who are using sterilization, by type of sterilization, according to region and country *(cont'd.)*

Country/year	Source	% using sterilization			No. of women in union* (in millions)	Total no. of users† (in millions)	No. of couples using male sterilization (in millions)	No. of couples using female sterilization (in millions)	Notes
		Total	Male	Female					
Middle East *(cont'd.)*									
United Arab Emirates, 1995	UN/ESA	4.3	0.1	4.2	0.2	0.009	0.000	0.008	8, 25
Yemen, 1997	DHS	1.5	0.1	1.4	2.2	0.033	0.002	0.031	
Sub-Saharan Africa						**1.675**	**0.112**	**1.563**	
Benin, 1996	DHS	0.4	NA	0.4	1.0	0.004	NA	0.004	
Botswana, 1988	DHS	4.6	0.3	4.3	0.1	0.005	0.000	0.004	
Burkina Faso, 1992–1993	DHS	0.2	Z	0.2	1.8	0.004	NA	0.004	
Burundi, 1987	DHS	0.1	NA	0.1	0.9	0.001	NA	0.001	
Cameroon, 1998	DHS	1.5	NA	1.5	1.9	0.029	NA	0.029	
Cape Verde, 1998	CDC	12.8	Z	12.8	0.1	0.015	0.000	0.015	
Central African Republic, 1994–1995	DHS	0.4	NA	0.4	0.5	0.002	NA	0.002	
Chad, 1996–1997	DHS	0.2	Z	0.2	NA	NA	NA	NA	
Comoros, 1996	DHS	2.8	NA	2.8	0.1	0.003	NA	0.003	
Congo, Democratic Republic of (Kinshasa), 1991	UN/ESA	0.3	0.1	0.2	6.7	0.020	0.007	0.013	
Côte d'Ivoire, 1998–1999	DHS	0.1	NA	0.1	2.3	0.002	NA	0.002	
Eritrea, 1995–1996	DHS	0.3	NA	0.3	0.6	0.002	NA	0.002	
Ethiopia, 1990	UN/ESA	0.2	Z	0.2	9.2	0.018	NA	0.018	27, 28
Gambia, 1990	UN/ESA	0.4	Z	0.4	0.2	0.001	NA	0.001	
Ghana, 1998	DHS	1.3	Z	1.3	2.7	0.035	NA	0.035	
Guinea, 1992–1993	UN/ESA	0.1	Z	0.1	1.2	0.001	NA	0.001	
Kenya, 1998	DHS	6.2	NA	6.2	3.9	0.242	NA	0.242	
Lesotho, 1991–1992	UN/ESA	1.4	Z	1.4	0.2	0.003	NA	0.003	
Liberia, 1986	DHS	1.1	NA	1.1	0.3	0.003	NA	0.003	
Madagascar, 1997	DHS	1.0	Z	1.0	2.1	0.021	NA	0.021	
Malawi, 1996	DHS	2.5	NA	2.5	1.4	0.035	NA	0.035	
Mali, 1995–1996	DHS	0.3	NA	0.3	2.2	0.007	NA	0.007	
Mauritius, 1991	CDC	7.2	Z	7.2	0.2	0.014	NA	0.014	4
Mozambique, 1997	DHS	0.7	NA	0.7	3.0	0.021	NA	0.021	
Namibia, 1992	DHS	7.6	0.2	7.4	0.2	0.015	0.000	0.015	
Niger, 1998	DHS	0.1	NA	0.1	1.5	0.002	NA	0.002	
Nigeria, 1990	DHS	0.3	NA	0.3	19.1	0.057	NA	0.057	
Réunion, 1990	WP/98 Survey	5.1	Z	5.1	0.1	0.005	NA	0.005	
Rwanda, 1992	DHS	0.7	NA	0.7	0.7	0.005	NA	0.005	
Senegal, 1997	DHS	0.5	NA	0.5	1.4	0.007	NA	0.007	

(cont'd.)

Supplement 2.2. Percentage and number of women of reproductive age currently in union who are using sterilization, by type of sterilization, according to region and country *(cont'd.)*

Country/year	Source	% using sterilization			No. of women in union* (in millions)	Total no. of users† (in millions)	No. of couples using male sterilization (in millions)	No. of couples using female sterilization (in millions)	Notes
		Total	Male	Female					
Sub-Saharan Africa *(cont'd.)*									
South Africa, 1998	DHS	17.9	2.1	15.8	4.8	0.859	0.101	0.758	
Sudan (Northern), 1992–1993	UN/ESA	0.9	Z	0.9	4.2	0.038	NA	0.038	
Swaziland, 1988	CDC	5.0	0.3	4.7	0.1	0.005	0.000	0.005	29
Tanzania, 1996	DHS	1.9	NA	1.9	4.6	0.087	NA	0.087	
Togo, 1998	DHS	0.4	NA	0.4	0.7	0.003	NA	0.003	
Uganda, 1995	DHS	1.4	NA	1.4	2.9	0.041	NA	0.041	
Zambia, 1996	DHS	2.0	Z	2.0	1.2	0.024	NA	0.024	
Zimbabwe, 1994	DHS	2.5	0.2	2.3	1.6	0.040	0.003	0.037	
North Africa						**0.508**	**0.000**	**0.508**	
Algeria, 1992	WP/98 PAPCHILD	1.1	Z	1.1	4.0	0.044	NA	0.044	
Egypt, 1995–1996	DHS	1.1	NA	1.1	10.0	0.110	NA	0.110	
Libya, 1995	WP/98 PAPCHILD	3.8	NA	3.8	0.7	0.027	NA	0.027	
Morocco, 1995	DHS	4.3	NA	4.3	3.8	0.163	NA	0.163	
Tunisia, 1994	WP/98 PAPCHILD	12.6	NA	12.6	1.3	0.164	NA	0.164	

* Based on 1995 UN estimates from censuses and surveys.

† Total may exceed sum of male and female sterilizations because for some countries totals are the only data available.

Source notes:

CDC = data from a maternal health, contraceptive prevalence or reproductive health survey conducted by the Division of Reproductive Health, U.S. Centers for Disease Control and Prevention (CDC).

CPS = data from Contraceptive Prevalence Survey program data (either Westinghouse Health Systems or the CDC).

DHS = Demographic and Health Survey data.

PAPCHILD = data from the Pan Arab Project for Child Development of the League of Arab States.

Survey = data taken from a nationwide survey conducted by a national government or independent organization that is not a contraceptive prevalence survey or survey conducted as part of the DHS or World Fertility Survey.

UN/ESA = data from the United Nations Department of Economic and Social Affairs, Population Division, as published in UN Population Division, 1999.

VHS = U.S. Vital and Health Statistics.

WP/98 = data taken from U.S. Bureau of the Census, *World Population Profile, 1998.*

NA = data not available.

Z = negligible (<0.1%).

Explanatory notes:

1. Data refer to women aged 10–49.
2. Data refer to all women aged 15–49, regardless of marital status.
3. Data refer to women aged 13–49.
4. Data refer to women aged 15–44.
5. Data refer to peninsular Malaysia only.
6. Coverage is not national.
7. Data refer to women aged 20–49.
8. Preliminary or provisional data.
9. Male sterilization rates represent <0.7%.
10. Data refer to women aged 20–54.
11. Data refer to the Flemish population only.
12. Data include individuals sterilized for noncontraceptive purposes.
13. Data refer to all sexually active women.
14. Data refer to women aged 18–44.
15. Data refer to women aged 20–39.
16. Data refer to women aged 18–42.
17. Data are for women born in 1945, 1950, 1965, and 1968 only. These women were 20, 23, 28, and 43 at the time of the survey.
18. Data refer to women aged 18–49.
19. From unpublished tables, Swiss Federal Statistical Office, Family and Fertility Survey 1994–1995.
20. Data refer to women aged 16–49.
21. Data refer to Great Britain, and do not include Northern Ireland.
22. Data refer to women aged 18–34.
23. Data refer to women aged 18–41.
24. Survey was limited to three sites (Ivanovo, Yekaterinburg, and Perm); the percentages noted here represent averages.
25. Data refer to nationals only.
26. Data refer to ages <50.
27. Data refer to ever-married women.
28. Excludes Eritrea, Tigray, Asseb, Ogaden, parts of Gondar and Wello, and nomadic populations.
29. Data refer to ever-married women and unmarried women who have had a child.

Supplement 2.3. Approximate annual incidence of female sterilization per 100 women of reproductive age who were ever in union, by number of years prior to survey

	No. of years prior to survey					
Country/year/source	5	4	3	2	1	5-year average
Bangladesh, 1987 (DHS)	1.9	2.5	2.4	2.3	1.8	2.2
Bangladesh, 1993–1994 (DHS)	0.5	0.5	0.5	0.3	0.2	0.4
Bangladesh, 1996–1997 (DHS)	0.4	0.3	0.2	0.2	0.1	0.2
Belize, 1991 (CDC)*	1.6	1.3	1.5	2.4	1.6	1.7
Bolivia, 1989 (DHS)	0.4	0.4	0.4	0.2	0.5	0.4
Bolivia, 1993–1994 (DHS)	0.4	0.2	0.4	0.4	0.5	0.4
Bolivia, 1998 (DHS)	0.5	0.4	0.6	0.5	0.7	0.5
Brazil, 1986 (DHS)*	2.8	3.3	2.6	2.7	3.4	3.0
Brazil, 1991 (DHS)†	2.4	3.5	3.5	3.4	3.7	3.3
Brazil, 1996 (DHS)	2.1	2.7	2.5	2.6	2.5	2.5
Cape Verde, 1998 (CDC)	1.1	1.5	1.5	1.2	1.7	1.4
Colombia, 1986 (DHS)	1.4	1.7	1.9	1.7	2.0	1.7
Colombia, 1990 (DHS)	1.2	1.6	2.3	1.5	2.1	1.7
Colombia, 1995 (DHS)	1.5	1.6	2.1	1.8	1.9	1.8
Costa Rica, 1993 (CDC)	1.2	1.0	2.2	1.5	2.0	1.6
Dominican Republic, 1986 (DHS)	2.2	2.1	3.1	2.5	3.5	2.7
Dominican Republic, 1991 (DHS)	3.1	2.4	2.9	2.5	3.5	2.9
Dominican Republic, 1996 (DHS)	2.4	2.4	2.8	2.9	2.6	2.6
Ecuador, 1987 (DHS)	1.5	1.0	1.3	1.6	1.5	1.4
Ecuador, 1989 (CDC)	1.3	1.4	1.3	1.6	1.5	1.4
Ecuador, 1994 (CDC)	1.3	1.5	1.5	1.4	1.8	1.5
Ecuador, 1999 (CDC)	1.4	1.5	1.7	1.7	1.8	1.6
Egypt, 1989 (DHS)	0.1	0.1	0.1	0.2	0.1	0.1
Egypt, 1992 (DHS)	0.1	0.1	0.1	0.1	0.1	0.1
Egypt, 1995–1996 (DHS)	0.1	0.1	0.0	0.1	0.1	0.1
El Salvador, 1985 (DHS)	3.2	2.4	2.9	3.1	3.2	3.0
El Salvador, 1988 (CDC)*	2.1	2.8	2.3	2.7	2.5	2.5
El Salvador, 1993 (CDC)	1.5	1.8	2.0	2.5	2.2	2.0
El Salvador, 1998 (CDC)	1.7	1.8	1.7	2.0	2.3	1.9
Ghana, 1988 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Ghana, 1993–1994 (DHS)	0.1	0.1	0.2	0.1	0.1	0.1
Guatemala, 1987 (DHS)*	0.9	1.0	1.1	0.9	0.9	1.0
Guatemala, 1995 (DHS)	1.1	0.8	1.0	1.0	1.3	1.0
Honduras, 1996 (CDC)	1.2	1.2	1.9	1.6	1.8	1.5
India, 1992–1993 (DHS)	2.0	1.7	1.8	2.0	1.7	1.8
Indonesia, 1987 (DHS)	0.3	0.3	0.3	0.4	0.3	0.3
Indonesia, 1991 (DHS)	0.2	0.2	0.2	0.2	0.2	0.2
Indonesia, 1994 (DHS)	0.2	0.2	0.2	0.2	0.3	0.2
Indonesia, 1997 (DHS)	0.1	0.2	0.1	0.2	0.2	0.2
Jamaica, 1997 (CDC)	1.1	0.5	0.8	0.9	0.7	0.8
Jordan, 1990 (DHS)‡	0.4	0.5	0.6	0.6	0.5	0.5
Kenya, 1989	0.0	0.0	0.0	0.0	0.0	0.0
Kenya, 1993 (DHS)	0.6	0.7	0.5	0.8	0.8	0.7
Kenya, 1998 (DHS)	0.5	0.3	0.5	0.4	0.5	0.4

(cont'd.)

Supplement 2.3. Approximate annual incidence of female sterilization per 100 women of reproductive age who were ever in union, by number of years prior to survey *(cont'd.)*

Country/year/source	No. of years prior to survey					5-year average
	5	4	3	2	1	
Mauritius, 1985 (CDC)§	0.5	0.4	0.4	0.5	0.5	0.5
Mauritius, 1991 (CDC)*	0.8	0.6	0.5	1.1	0.7	0.7
Mexico, 1987 (DHS)	1.3	1.5	2.0	2.3	2.3	1.9
Morocco, 1987 (DHS)	0.2	0.2	0.2	0.3	0.2	0.2
Morocco, 1992 (DHS)	0.1	0.3	0.2	0.2	0.4	0.2
Namibia, 1992 (DHS)	0.5	0.6	0.7	0.6	0.9	0.7
Nepal, 1996	0.0	0.0	0.0	0.0	0.0	0.0
Nicaragua, 1992–1993 (CDC)	1.6	1.7	1.2	1.4	2.3	1.6
Nicaragua, 1998 (DHS)	1.7	2.1	2.6	2.9	3.1	2.5
Panama, 1984 (CDC)	2.2	2.9	3.0	2.9	2.7	2.7
Paraguay, 1987 (CDC)*	0.1	0.5	0.5	0.7	0.4	0.4
Paraguay, 1990 (DHS)	0.5	0.7	0.7	0.9	1.0	0.8
Paraguay, 1995–1996 (CDC)	0.4	0.6	0.5	0.6	0.5	0.5
Paraguay, 1998 (CDC)*	0.5	1.0	0.8	1.0	1.0	0.9
Peru, 1986 (DHS)	0.6	0.5	0.4	0.6	0.4	0.5
Peru, 1991–1992 (DHS)	0.5	0.5	0.6	0.7	0.6	0.6
Peru, 1996 (DHS)	0.5	0.7	0.7	0.9	1.1	0.8
Philippines, 1993 (DHS)	0.7	0.8	0.7	0.7	0.7	0.7
Philippines, 1998 (DHS)	0.4	0.4	0.5	0.5	0.7	0.5
Puerto Rico, 1995–1996 (CDC)	2.4	2.7	2.5	2.2	2.2	2.4
Romania, 1999 (CDC)*	0.1	0.1	0.1	0.2	0.1	0.1
Sri Lanka, 1987 (DHS)	1.9	2.5	2.4	2.3	1.8	2.2
Swaziland, 1988 (CDC)	0.3	0.4	0.2	0.6	0.3	0.4
Tanzania, 1991–1992 (DHS)	0.2	0.2	0.2	0.4	0.3	0.3
Tanzania, 1996 (DHS)	0.2	0.2	0.2	0.2	0.3	0.2
Thailand, 1987 (DHS)	1.7	1.9	1.5	2.3	2.0	1.9
Trinidad and Tobago, 1987 (DHS)	0.4	0.6	0.8	0.9	1.1	0.8
Tunisia, 1988 (DHS)	1.0	1.3	0.9	0.8	1.3	1.1
Turkey, 1993 (DHS)	0.2	0.2	0.3	0.2	0.4	0.3
Ukraine, 1999 (CDC)*	0.1	0.1	0.2	0.2	0.1	0.1
United States, 1988 (NSFG)*	9.2	9.2	7.4	7.5	8.5	8.4
United States, 1995 (NSFG)*	6.3	6.1	6.3	6.9	7.1	6.5
Zambia, 1992 (DHS)	0.2	0.1	0.3	0.2	0.3	0.2
Zambia, 1996–1997 (DHS)	0.1	0.2	0.2	0.2	0.1	0.2
Zimbabwe, 1988–1989 (DHS)	0.2	0.2	0.3	0.3	0.2	0.2
Zimbabwe, 1994 (DHS)	0.2	0.2	0.2	0.4	0.3	0.3

* Data refer to ages 15–44.

† Data limited to Northeastern Brazil.

‡ Excludes the West Bank.

§ Data are not weighted.

Note: Data included here were generated at the request of EngenderHealth by Measure-DHS+ and by the Division of Reproductive Health, CDC.

Supplement 2.4. Approximate annual incidence of male sterilization among partners of women of reproductive age who were ever in union, per 100 couples ever in union, by number of years prior to survey

	No. of years prior to survey					
Country/year/source	**5**	**4**	**3**	**2**	**1**	**5-year average**
Bangladesh, 1987 (DHS)	0.5	0.6	0.5	0.4	0.4	0.5
Bangladesh, 1993–1994 (DHS)	0.1	0.0	0.1	0.0	0.0	0.0
Bangladesh, 1996–1997 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Bolivia, 1989 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Bolivia, 1993–1994 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Bolivia, 1998 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Brazil, 1986 (DHS)*	0.1	0.1	0.0	0.1	0.0	0.1
Brazil, 1991 (DHS)†	0.0	0.0	0.0	0.0	0.0	0.0
Brazil, 1996 (DHS)	0.1	0.4	0.3	0.3	0.2	0.3
Colombia, 1986 (DHS)	0.1	0.0	0.0	0.0	0.0	0.0
Colombia, 1990 (DHS)	0.1	0.0	0.1	0.1	0.1	0.1
Colombia, 1995 (DHS)	0.0	0.1	0.1	0.1	0.1	0.1
Dominican Republic, 1986 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Dominican Republic, 1991 (DHS)	0.0	0.0	0.0	0.1	0.0	0.0
Dominican Republic, 1996 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Ecuador, 1987 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Egypt, 1988–1989 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Egypt, 1992 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Egypt, 1995–1996 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
El Salvador, 1985 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Ghana, 1988 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Ghana, 1993–1994 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Guatemala, 1987 (DHS)*	0.1	0.1	0.1	0.1	0.1	0.1
Guatemala, 1995 (DHS)	0.1	0.1	0.1	0.1	0.2	0.1
India, 1992–1993 (DHS)	0.1	0.1	0.1	0.1	0.1	0.1
Indonesia, 1987 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Indonesia, 1991 (DHS)	0.0	0.0	0.0	0.1	0.1	0.0
Indonesia, 1994 (DHS)	0.1	0.1	0.1	0.1	0.0	0.1
Indonesia, 1997 (DHS)	0.0	0.0	0.0	0.1	0.0	0.0
Jordan, 1990 (DHS)‡	0.0	0.0	0.0	0.0	0.0	0.0
Kenya, 1989 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Kenya, 1993 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Kenya, 1998 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Mexico, 1987 (DHS)	0.0	0.1	0.0	0.1	0.1	0.1
Morocco, 1987 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Morocco, 1992 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Namibia, 1992 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Nepal, 1996 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Nicaragua, 1998 (DHS)	0.0	0.0	0.0	0.1	0.0	0.0
Paraguay, 1990 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Peru, 1986 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Peru, 1991–1992 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Peru, 1996 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Philippines, 1993 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Philippines, 1998 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0

(cont'd.)

Supplement 2.4. Approximate annual incidence of male sterilization among partners of women of reproductive age who were ever in union, per 100 couples ever in union, by number of years prior to survey *(cont'd.)*

Country/year/source	No. of years prior to survey					5-year average
	5	4	3	2	1	
Sri Lanka, 1987 (DHS)	0.5	0.6	0.5	0.4	0.4	0.5
Tanzania, 1991–1992 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Tanzania, 1996 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Thailand, 1987 (DHS)	0.4	0.2	0.5	0.7	0.5	0.5
Trinidad and Tobago, 1987 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Tunisia, 1988 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Turkey, 1993 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Zambia, 1992 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Zambia, 1996–1997 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0
Zimbabwe, 1988–1989 (DHS)	0.0	0.0	0.1	0.0	0.0	0.0
Zimbabwe, 1994 (DHS)	0.0	0.0	0.0	0.0	0.0	0.0

* Data refer to ages 15–44.

† Data limited to Northeastern Brazil.

‡ Excludes the West Bank.

Note: Data included here were generated at the request of EngenderHealth by Measure-DHS+ and by the Division of Reproductive Health, CDC.

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Asia							
Bangladesh							
1985	WP/98 CPS	25.3	9.4	1.5	7.9	37.2	1
1989	WP/98 Survey	31.4	10.0	1.2	8.8	31.8	1
1991	WP/98 Survey	39.9	10.3	1.2	9.1	25.8	1
1993–1994	DHS	44.9	9.3	1.1	8.2	20.7	
1996–1997	DHS	49.2	8.7	1.1	7.6	17.7	2
Bhutan							
1994	UN/ESA	18.8	11.1	8.0	3.1	59.0	3
Cambodia							
2000	DHS	23.8	1.5	Z	1.5	6.3	
China							
1988	WP/98 Survey	71.1	35.0	7.8	27.2	49.2	
1992	CDC	84.6	46.1	10.2	35.9	54.5	
Hong Kong							
1984	WP/98 PC	72.4	21.0	NA	NA	29.0	4
1987	WP/98 Survey	80.8	23.8	0.9	22.9	29.5	
India							
1988	WP/98 Survey	42.9	30.8	NA	30.8	71.8	4
1990	WP/98 Survey	44.9	31.3	NA	NA	69.7	4
1992–1993	DHS	40.6	30.7	3.4	27.3	75.6	5

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Asia *(cont'd.)*							
Indonesia							
1985	WP/98 Survey	38.5	1.6	0.4	1.2	4.2	
1987	DHS	47.7	3.3	0.2	3.1	6.9	
1991	DHS	49.7	3.3	0.6	2.7	6.6	
1994	DHS	54.7	3.8	0.7	3.1	6.9	
1997	DHS	57.4	3.4	0.4	3.0	5.9	
Japan							
1986	UN/ESA	64.3	9.9	1.6	8.3	15.4	
1988	UN/ESA	56.3	4.2	0.9	3.3	7.5	
1990	UN/ESA	58.0	5.7	NA	NA	9.8	
1994	UN/ESA	58.6	4.1	0.7	3.4	7.0	
Korea, Republic of							
1985	UN/ESA	70.4	40.5	8.9	31.6	57.5	4
1988	UN/ESA	77.3	48.2	11.0	37.2	62.4	4
1991	UN/ESA	79.4	47.3	12.0	35.3	59.6	4
Lao People's Democratic Republic							
1993	UN/ESA	18.6	5.1	NA	5.1	27.4	
Malaysia							
1988	UN/ESA	48.3	6.8	NA	NA	14.1	6
Mongolia							
1994	UN/ESA	60.7	0.9	0.3	0.6	1.5	
Myanmar							
1992	UN/ESA	16.8	5.5	1.8	3.7	32.7	
Nepal							
1986	WP/98 Survey	16.8	13.7	6.4	7.3	81.5	7
1991	WP/98 Survey	25.1	19.6	7.5	12.1	78.1	
1996	DHS	28.5	17.5	5.4	12.1	61.4	
Pakistan							
1990–1991	DHS	11.8	3.5	Z	3.5	29.7	
1994–1995	UN/ESA	17.8	5.0	Z	5.0	28.1	
Philippines							
1988	WP/98 Survey	36.2	11.4	0.4	11.0	31.5	4
1993	DHS	40.0	12.3	0.4	11.9	30.8	
1995	WP/98 Survey	53.1	11.4	0.1	11.3	21.5	
1996	WP/98 Survey	48.1	10.8	0.2	10.6	22.5	
1998	DHS	46.5	10.4	0.1	10.3	22.4	
Sri Lanka							
1987	DHS	61.7	29.8	4.9	24.9	48.3	8
1993	UN/ESA	66.1	27.2	3.7	23.5	41.1	9
Thailand							
1985	WP/98 Survey	59.0	23.2	3.7	19.5	39.3	
1987	DHS	65.5	28.5	5.7	22.8	43.5	
1993	UN/ESA	73.9	22.6	2.8	19.8	30.6	4
Vietnam							
1988	WP/98 Survey	53.2	3.0	0.3	2.7	5.6	
1994	WP/98 Nguyen	65.0	4.1	0.2	3.9	6.3	
1997	DHS	75.3	6.8	0.5	6.3	9.0	

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Oceania							
Australia							
1986	WP/98 Survey	76.1	38.1	10.4	27.7	50.1	10
New Zealand							
1995	UN/ESA	74.9	33.0	18.0	15.0	44.1	10, 11
Papua New Guinea							
1996	UN/ESA	25.9	7.8	0.2	7.6	30.1	
Latin America and the Caribbean							
Antigua and Barbuda							
1988	WP/98 CPS	52.6	11.0	NA	11.0	20.9	4
Bahamas							
1988	WP/98 CPS	64.9	17.2	NA	17.2	26.5	4
Barbados							
1988	UN/ESA	55.0	10.7	0.3	10.4	19.5	4
Belize							
1985	WP/98 Survey	42.9	11.1	0.1	11.0	25.9	4
1991	CDC	46.7	18.7	NA	18.7	40.0	4
Bolivia							
1989	WP/98 DHS	30.3	4.4	NA	4.4	14.5	
1993–1994	WP/98 DHS	45.3	4.6	NA	4.6	10.2	
1998	DHS	48.3	6.5	Z	6.5	13.5	
Brazil							
1986	DHS	65.8	27.6	0.8	26.8	41.9	4
1991	DHS	59.2	37.8	0.1	37.7	63.9	12
1996	DHS	76.7	42.7	2.6	40.1	55.7	
Colombia							
1986	DHS	64.8	18.7	0.4	18.3	28.9	
1990	DHS	66.1	21.4	0.5	20.9	32.4	
1995	DHS	72.2	26.4	0.7	25.7	36.6	
Costa Rica							
1986	CDC	69.0	17.2	0.5	16.7	24.9	
1993	CDC	75.0	21.0	1.3	19.7	28.0	
Cuba							
1987	UN/ESA	70.0	22.0	NA	22.0	31.4	
Dominica							
1987	UN/ESA	49.8	12.6	NA	12.6	25.3	4
Dominican Republic							
1986	WP/98 DHS	50.0	33.0	0.1	32.9	66.0	
1991	WP/98 DHS	56.4	38.5	NA	38.5	68.3	
1996	DHS	63.7	41.0	0.1	40.9	64.4	
Ecuador							
1987	WP/98 DHS	44.3	15.0	NA	15.0	33.9	
1989	CDC	52.9	18.3	NA	18.3	34.6	
1994	CDC	56.8	19.8	NA	19.8	34.9	
1999	CDC	65.8	22.5	NA	22.5	34.2	

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Latin America and the Caribbean *(cont'd.)*							
El Salvador							
1985	DHS	47.3	32.5	0.7	31.8	68.7	
1988	CDC	47.1	30.2	0.6	29.6	64.1	4
1993	CDC	53.3	31.5	NA	31.5	59.1	4
1998	CDC	59.7	32.4	NA	32.4	54.3	4, 13
Guatemala							
1987	DHS	23.2	11.3	0.9	10.4	48.7	4
1995	DHS	31.4	15.8	1.5	14.3	50.3	
Haiti							
1989	CDC	10.2	2.5	NA	2.5	24.5	
1994–1995	DHS	18.0	3.1	NA	3.1	17.2	
Honduras							
1987	UN/ESA	40.6	12.8	0.2	12.6	31.5	4
1991–1992	UN/ESA	46.7	15.8	0.2	15.6	33.8	4
1996	CDC	50.0	18.1	NA	18.1	36.2	4
Jamaica							
1989	CDC	54.6	13.6	NA	13.6	24.9	
1993	CDC	62.0	12.5	NA	12.5	20.2	4
1997	CDC	66.0	12.3	NA	12.3	18.6	
Mexico							
1987	WP/98 DHS	52.7	19.4	0.8	18.6	36.8	
1992	ENADID	63.1	27.9	1.0	26.9	44.2	
1995	UN/ESA	66.5	27.3	NA	NA	41.1	11
Nicaragua							
1992–1993	CDC	48.7	18.8	0.3	18.5	38.6	
1998	DHS	60.3	26.6	0.5	26.1	44.1	
Panama							
1984	CDC	58.8	33.5	0.4	33.1	57.0	4
Paraguay							
1987	CDC	44.8	4.0	NA	4.0	8.9	4
1990	WP/98 DHS	48.4	7.4	NA	7.4	15.3	
1995–1996	CDC	50.7	6.8	Z	6.8	13.4	14
1998	CDC	57.4	8.0	Z	8.0	13.9	4, 14
Peru							
1986	WP/98 DHS	45.8	6.1	NA	6.1	13.3	
1991–1992	DHS	59.0	8.0	0.1	7.9	13.6	
1996	DHS	64.2	9.7	0.2	9.5	15.1	
Puerto Rico							
1995–1996	CDC	77.5	48.7	3.5	45.2	62.8	
Saint Lucia							
1988	WP/98 CPS	47.3	8.6	Z	8.6	18.2	4
Saint Vincent and the Grenadines							
1988	WP/98 CPS	58.3	13.1	Z	13.1	22.5	4
Trinidad and Tobago							
1987	DHS	52.7	8.4	0.2	8.2	15.9	
North America							
Canada							
1984	UN/ESA	73.1	43.5	12.9	30.6	59.5	15
1995	UN/ESA	75.2	46.0	16.2	29.8	61.2	11

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
North America *(cont'd.)*							
United States							
1988	UN/ESA	74.3	36.3	12.9	23.4	48.9	4
1990	UN/ESA	70.7	37.3	13.6	23.7	52.8	4
1995	VHS	76.4	38.7	14.9	23.8	50.7	4
Western Europe							
Belgium							
1991	UN/ESA	79.6	19.1	7.6	11.5	24.0	16, 17, 18
Denmark							
1988	UN/ESA	78.0	10.0	5.0	5.0	12.8	4, 19
Finland							
1989	WP/98 Survey	70.4	9.7	1.0	8.7	13.8	20
1994	WP/98 Survey	79.3	9.3	1.0	8.3	11.7	21
France							
1988	WP/98 Survey	79.9	8.7	NA	8.7	10.9	15
1994	WP/98 Survey	75.1	4.9	0.3	4.6	6.5	
Germany							
1985	UN/ESA	77.9	12.4	2.1	10.3	15.9	4, 22
1992	UN/ESA	74.7	0.9	NA	0.9	1.2	23
Netherlands							
1985	WP/98 Survey	72.0	14.0	NA	NA	19.4	24
1988	WP/98 Survey	70.0	10.0	7.0	3.0	14.3	25
1993	WP/98 Survey	74.0	13.0	9.0	4.0	17.6	26
Norway							
1988–1989	WP/98 Survey	75.5	14.7	4.3	10.4	19.5	27
Spain							
1985	UN/ESA	59.4	4.6	0.3	4.3	7.7	15
Switzerland							
1995	WP/98 Survey	81.9	22.0	8.3	13.7	26.9	10, 28
United Kingdom							
1986	UN/ESA	81.0	31.0	16.0	15.0	38.3	29, 30
1989	WP/98 Survey	72.0	23.0	12.0	11.0	31.9	31
1993	UN/ESA	82.0	32.0	18.0	14.0	39.0	29, 30
Eastern Europe and Central Asia							
Azerbaijan							
2001	CDC	55.4	1.2	Z	1.2	2.2	4
Belarus							
1995	UN/ESA	50.4	0.8	Z	0.8	1.6	32
Czech Republic							
1993	CDC	68.9	2.7	NA	2.7	3.9	4
Georgia							
1999	CDC	40.5	1.6	Z	1.6	4.0	
Hungary							
1993	WP/98 Survey	84.4	5.1	NA	NA	6.0	33
Kazakhstan							
1995	DHS	59.1	0.7	NA	0.7	1.2	

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Eastern Europe and Central Asia *(cont'd.)*							
Kyrgyz Republic							
1997	DHS	59.5	1.8	NA	1.8	3.0	
Latvia							
1995	WP/98 Survey	67.8	2.1	NA	NA	3.1	15
Moldova							
1997	CDC	73.7	3.4	NA	3.4	4.6	4
Romania							
1993	CDC	57.3	1.4	NA	1.4	2.4	4
1999	CDC	63.8	2.5	Z	2.5	3.9	
Russia							
1996	CDC	71.8	2.0	NA	2.0	2.8	4, 34
Slovakia							
1991	WP/98 UN	74.0	4.0	Z	4.0	5.4	4, 19
Slovenia							
1989	WP/98 Survey	91.6	0.2	NA	NA	0.2	4
Ukraine							
1999	CDC	67.5	1.4	Z	1.4	2.1	
Uzbekistan							
1996	DHS	55.6	0.7	NA	0.7	1.3	
Middle East							
Bahrain							
1989	UN/ESA	53.4	7.1	NA	7.1	13.3	1, 35, 36
1995	UN/ESA	60.9	7.1	1.1	6.0	11.7	11, 35, 36
Iran							
1992	UN/ESA	64.6	8.5	0.9	7.6	13.2	4
Iraq							
1989	UN/ESA	13.7	1.4	NA	1.4	10.2	35, 36
Jordan							
1985	CDC	26.5	4.9	Z	4.9	18.5	37, 38
1990	DHS	40.0	5.6	Z	5.6	14.0	
1997	DHS	52.6	4.2	NA	4.2	8.0	
Kuwait							
1987	UN/ESA	34.6	2.0	NA	2.0	5.8	1, 36
Lebanon							
1996	WP/98 PAPCHILD	61.0	4.2	NA	4.2	6.9	
Oman							
1988	UN/ESA	8.6	2.2	NA	2.2	25.6	1, 36
1995	UN/ESA	21.5	4.5	Z	4.5	20.9	11, 35, 36
Qatar							
1987	UN/ESA	32.3	4.5	NA	4.5	13.9	1
Syria							
1993	WP/98 PAPCHILD	39.6	2.2	Z	2.2	5.6	
Turkey							
1988	CDC	63.4	1.8	0.1	1.7	2.8	39
1993	DHS	62.6	2.9	Z	2.9	4.6	

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Middle East *(cont'd.)*							
United Arab Emirates							
1995	UN/ESA	26.7	4.3	0.1	4.2	16.1	35, 36
Yemen							
1991–1992	DHS	9.7	0.9	0.1	0.8	9.3	
1997	DHS	20.8	1.5	0.1	1.4	7.2	35
Sub-Saharan Africa							
Benin							
1996	DHS	16.4	0.4	NA	0.4	2.4	
Botswana							
1984	UN/ESA	27.8	1.5	Z	1.5	5.4	
1988	DHS	33.0	4.6	0.3	4.3	13.9	
Burkina Faso							
1992–1993	DHS	24.9	0.2	Z	0.2	0.8	
Burundi							
1987	DHS	8.7	0.1	NA	0.1	1.1	
Cameroon							
1991	DHS	16.1	1.2	NA	1.2	7.5	
1998	DHS	19.3	1.5	NA	1.5	7.8	
Cape Verde							
1998	CDC	52.9	12.8	Z	12.8	24.2	
Central African Republic							
1994–1995	DHS	14.8	0.4	NA	0.4	2.7	
Chad							
1996–1997	DHS	4.1	0.2	Z	0.2	4.9	
Comoros							
1996	DHS	21.0	2.8	NA	2.8	13.3	
Congo, Democratic Republic of (Kinshasa)							
1991	UN/ESA	8.0	0.3	0.1	0.2	3.8	
Côte d'Ivoire							
1994	DHS	11.4	0.2	NA	0.2	1.8	
1998–1999	DHS	15.0	0.1	NA	0.1	0.6	
Eritrea							
1995–1996	DHS	8.0	0.3	NA	0.3	3.8	
Ethiopia							
1990	UN/ESA	4.3	0.2	Z	0.2	4.7	40, 41
Gambia							
1990	UN/ESA	11.8	0.4	Z	0.4	3.4	
Ghana							
1988	DHS	12.9	1.0	NA	1.0	7.8	
1993	DHS	20.3	0.9	NA	0.9	4.4	
1995	WP/98 Survey	28.0	2.0	NA	NA	7.1	
1998	DHS	22.0	1.3	Z	1.3	5.9	
Guinea							
1992–1993	UN	1.7	0.1	Z	0.1	5.9	

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Sub-Saharan Africa *(cont'd.)*							
Kenya							
1984	UN/ESA	17.0	2.6	Z	2.6	15.3	
1989	DHS	26.9	4.7	Z	4.7	17.5	
1993	DHS	32.7	5.5	NA	5.5	16.8	
1998	DHS	39.0	6.2	NA	6.2	15.9	
Lesotho							
1991–1992	UN/ESA	23.2	1.4	Z	1.4	6.0	
Liberia							
1986	DHS	6.4	1.1	NA	1.1	17.2	
Madagascar							
1992	DHS	16.7	0.9	Z	0.9	5.4	
1997	DHS	19.4	1.0	Z	1.0	5.2	
Malawi							
1992	DHS	13.0	1.7	Z	1.7	13.1	
1996	DHS	21.9	2.5	NA	2.5	11.4	
Mali							
1987	DHS	4.7	0.1	NA	0.1	2.1	
1995–1996	DHS	6.7	0.3	NA	0.3	4.5	
Mauritius							
1985	CDC	75.3	4.7	NA	4.7	6.2	
1991	CDC	74.7	7.2	NA	7.2	9.6	4
Mozambique							
1997	DHS	5.6	0.7	NA	0.7	12.5	
Namibia							
1989	WP/98 Survey	26.4	6.1	0.1	6.0	23.1	1
1992	DHS	28.9	7.6	0.2	7.4	26.3	
Niger							
1992	DHS	4.4	0.1	NA	0.1	2.3	
1998	DHS	8.2	0.1	NA	0.1	1.2	
Nigeria							
1986	DHS	6.1	0.1	NA	0.1	1.6	42.0
1990	DHS	6.0	0.3	NA	0.3	5.0	
Réunion							
1990	WP/98 Survey	72.9	5.1	Z	5.1	7.0	
Rwanda							
1983	UN/ESA	10.1	Z	Z	Z	Z	
1992	DHS	21.2	0.7	NA	0.7	3.3	43
Senegal							
1992–1993	DHS	7.5	0.4	NA	0.4	5.3	
1997	DHS	12.9	0.5	NA	0.5	3.9	
South Africa							
1988	UN/ESA	49.7	9.4	1.4	8.0	18.9	1
1998	DHS	56.3	17.9	2.1	15.8	32.0	
Sudan							
1989–1990	DHS	8.7	0.8	NA	0.8	9.2	

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Country/year	Source	% using any method	% using sterilization			Sterilization as a % of overall prevalence	Notes
			Total	Male	Female		
Sub-Saharan Africa *(cont'd.)*							
Sudan (Northern)							
1992–1993	UN/ESA	8.3	0.9	Z	0.9	10.8	
Swaziland							
1988	CDC	20.8	5.0	0.3	4.7	24.0	44
Tanzania							
1988	WP/98 USAID	7.0	NA	NA	NA	NA	4
1991–1992	DHS	10.4	1.6	Z	1.6	15.4	
1994	DHS-KAP	20.4	2.0	NA	2.0	9.8	
1996	DHS	18.4	1.9	NA	1.9	10.3	
Togo							
1988	DHS	33.9	0.6	NA	0.6	1.8	
1998	DHS	23.5	0.4	NA	0.4	1.7	
Uganda							
1988–1989	DHS	4.9	0.8	NA	0.8	16.3	
1995	DHS	14.8	1.4	NA	1.4	9.5	
Zambia							
1992	DHS	15.2	2.1	Z	2.1	13.8	
1996	DHS	25.9	2.0	Z	2.0	7.7	
Zimbabwe							
1988–1989	DHS	43.1	2.5	0.2	2.3	5.8	
1994	DHS	48.1	2.5	0.2	2.3	5.2	
North Africa							
Algeria							
1986–1987	UN/ESA	35.5	1.3	Z	1.3	3.7	
1992	WP 98/PAPCHILD	50.9	1.1	Z	1.1	2.2	
Egypt							
1984	WP/98 CPS	30.3	1.5	NA	1.5	5.0	
1988	DHS	37.8	1.5	Z	1.5	4.0	
1992	DHS	47.1	1.1	NA	1.1	2.3	
1995–1996	DHS	47.9	1.1	NA	1.1	2.3	
Libya							
1995	WP/98 PAPCHILD	45.2	3.8	NA	3.8	8.4	
Morocco							
1987	DHS	35.9	2.2	NA	2.2	6.1	
1992	DHS	41.5	3.0	NA	3.0	7.2	
1995	DHS	50.3	4.3	NA	4.3	8.5	
Tunisia							
1988	DHS	49.8	11.5	NA	11.5	23.1	
1994	WP/98 PAPCHILD	59.7	12.6	NA	12.6	21.1	

Source notes:

CDC = data from a maternal health, contraceptive prevalence or reproductive health survey conducted by the Division of Reproductive Health, U.S. Centers for Disease Control and Prevention (CDC).

CPS = data from Contraceptive Prevalence Survey program data (either Westinghouse Health Systems or the CDC).

DHS = Demographic and Health Survey data.

ENADID = Encuesta Nacional de la Dinámica Demográfica de 1992.

KAP = knowledge, attitudes, and practices survey.

(cont'd.)

Supplement 2.5. Percentage of women of reproductive age currently in union who are using contraception, percentage who are using sterilization, by type, and share of sterilization as percentage of overall prevalence *(cont'd.)*

Source notes: (cont'd.)

PAPCHILD = data from the Pan Arab Project for Child Development of the League of Arab States.

PC = data from the Population Council, derived from service statistics, sometimes with an estimate for private-sector contraceptive use.

Survey = data taken from a nationwide survey conducted by a national government or independent organization that is not a contraceptive prevalence survey or survey conducted as part of the DHS or World Fertility Survey.

UN/ESA = data from the United Nations (UN) Department of Economic and Social Affairs, Population Division, as published in UN Population Division, 1999.

USAID = data from the U.S. Agency for International Development.

VHS = U.S. Vital and Health Statistics.

WP/98 = data taken from the U.S. Bureau of the Census 1999, *World Population Profile, 1998.*

WP/98 Nguyen = data from Nguyen et al. (1996), as reported in U.S. Bureau of the Census, 1999.

NA = data not available.

Z = negligible (<0.1%).

Explanatory notes:

1. Data refer to ages <50.
2. Represents women aged 10–49.
3. Data refer to all women aged 15–49, regardless of marital status.
4. Data refer to women aged 15–44.
5. Data refer to women aged 13–49.
6. Data refer to peninsular Malaysia only.
7. Data refer to women aged 15–50.
8. Data exclude northern and eastern provinces.
9. Coverage is not national.
10. Data refer to women aged 20–49.
11. Preliminary or provisional data.
12. Data are limited to the population of Northeastern Brazil.
13. Male sterilization rates represent <0.7%.
14. Data on contraceptive prevalence do not include use of herbal medicines known as "yuyos."
15. Data refer to women aged 18–49.
16. Data refer to women aged 20–40.
17. Data refer to the Flemish population only.
18. Data include individuals sterilized for noncontraceptive purposes.
19. Data refer to all sexually active women.
20. Data refer to women aged 21–49.
21. Data refer to women aged 18–44.
22. Data refer to the Federal Republic of Germany only.
23. Data refer to women aged 20–39.
24. Data refer to women aged 21–37.
25. Data refer to women aged 18–37.
26. Data refer to women aged 18–42.
27. Data are for women who were born in 1945, 1950, 1965, and 1968 only. These women were 20, 23, 28, and 43 at the time of the survey.
28. From unpublished tables, Swiss Federal Statistical Office, Family and Fertility Survey 1994–1995.
29. Data refer to women aged 16–49.
30. Data refer to Great Britain, and do not include Northern Ireland.
31. Data refer to all women aged 18–44.
32. Data refer to women aged 18–34.
33. Data refer to women aged 18–41.
34. Survey was limited to three sites (Ivanovo, Yekaterinburg, and Perm); the percentages noted here represent averages.
35. Adjusted from source to exclude breastfeeding.
36. Data refer to nationals only.
37. Data refer to women aged 17–51.
38. Excludes the West Bank.
39. The total prevalence rate refers to currently married women, while data by method are based on exposed women only.
40. Refers to ever-married women.
41. Excludes Eritrea, Tigray, Asseb, Ogaden, parts of Gondar and Wello, and nomadic populations.
42. Data refer to Ondo State only.
43. Data refer to women aged 15–50.
44. Data refer to ever-married women and unmarried women who have had a child.

Chapter 3

Characteristics of Female Sterilization Users

Highlights:

- The prevalence of female sterilization and women's age at sterilization are inversely related: In countries where prevalence is high, the median age is generally low, while in low-prevalence countries, women often are not sterilized until older ages.
- In some high-prevalence countries (such as Brazil, Colombia, and the Dominican Republic), the proportion of women sterilized by some exact age (e.g., by age 30) rises steadily in each successively younger age cohort.
- In many countries in Asia and Latin America and the Caribbean, half of sterilized women have 3–4 children. In contrast, in China and the United States, half of sterilized women have two or fewer children, while in Africa, more than half of such women have five or more children.
- In Asia and Sub-Saharan Africa, most sterilization users reside in rural areas, while in Latin America and the Caribbean, North Africa, and North America, the majority of users live in urban locales.
- In many countries, more than 50% of women using female sterilization never used modern contraceptives before having the sterilization procedure performed.
- Sterilization procedures performed at a time not related to a pregnancy (known as interval sterilizations) tend to outnumber postpartum sterilizations among countries located in North Africa, South Asia, and Sub-Saharan Africa. Postpartum sterilizations are considerably more common than interval procedures, however, among several countries in Latin America and the Caribbean.

The social and demographic profiles of female sterilization users most likely differ greatly among countries as well as among regions. To illustrate these national and regional differences, this chapter presents information on the characteristics of sterilized women in union in selected countries. The data are derived from nationally representative population-based surveys of women of reproductive age conducted since the publication in 1985 of *Voluntary Sterilization: An International Fact Book*. The profiles reflect the characteristics of women in union who obtain sterilization services from both public and private sources. As a result of the lack of data from comparable surveys in developed countries, the chapter concentrates primarily on the profile of users in developing countries, with one exception: Data from the United States are included. Supplement 3.1 (page 79) collects user characteristics for all countries that have data available. Information regarding the characteristics of vasectomy users is not included in this chapter, as the sample sizes available from the surveys are too small to produce a valid analysis. (Chapter 5 presents information on characteristics of both female and male sterilization users, based on a review and critical analysis of the existing literature on voluntary contraceptive sterilization since 1985.)

Country information gathered from multiple data sets is presented to study the changes in user characteristics over time. The surveys are generally standardized and are administered by the same sources (the Demographic and Health Surveys project and the U.S. Centers for Disease Control and Prevention), which helps to ensure that the vari-

Table 3.1. Date and source of most recent national survey in selected countries, by region

Region	Country	Year of survey	Source
South Asia	Bangladesh	1996–1997	DHS
	Nepal	1996	DHS
Southeast Asia	Indonesia	1997	DHS
	Philippines	1998	DHS
East Asia	China*	1992	CDC
Latin America	Brazil	1996	DHS
	Colombia	1995	DHS
	El Salvador	1998	CDC
	Peru	1996	DHS
Caribbean	Dominican Republic	1996	DHS
North Africa	Egypt	1995–1996	DHS
	Morocco	1992	DHS
Sub-Saharan Africa	Ghana†	1993–1994	DHS
	Kenya	1998	DHS
	Tanzania	1996	DHS
	Zimbabwe	1994	DHS
North America	United States*	1995	VHS

* Missing some characteristics data.

† At the time the data for this book were being compiled, the final report for the 1998 Ghana DHS was not available.

Sources: Demographic and Health Survey (DHS); Centers for Disease Control and Prevention (CDC); and Vital and Health Statistics (VHS).

ables are similar across surveys. The selection of countries was based upon several factors, including geographical representation, availability of survey data from multiple years, and substantial change in sterilization prevalence. Regional outliers with strikingly high or low prevalence for the region were also selected. While global representation would be ideal, the lack of consecutive data from countries in some regions (Central Asia, Eastern Europe, and the Middle East) limits this chapter to examining South Asia, East Asia, Latin America and the Caribbean, North Africa, Sub-Saharan Africa, and North America (Table 3.1).

To some extent, these countries represent their regions; however, as country experiences vary greatly, it is difficult to generalize about the profile of a typical sterilization user in a region. Though the regional trends present a rough illustration of the type of individual who chooses sterilization, the explanation for why certain individuals choose sterilization must be analyzed at the country level, taking into account the various determinants of sterilization use.

Among the many factors that can determine levels of sterilization use, the major ones include the desire to end childbearing and the demand for contraception, knowledge of contraceptive choices and of service-delivery points, geographical access to services, availability of specific contraceptive methods, local preferences for certain methods, level of emphasis on sterilization as a contraceptive method, cultural norms regarding sterility, laws and restrictions surrounding sterilization, economic costs, and incentives. (Further discussion of the determinants of sterilization use can be found in Chapters 4 and 5.)

The relevant social and demographic characteristics examined in this chapter are age at sterilization, number of living children (or parity, in a few cases), educational level, and urban-rural residence. Data on previous use of modern contraceptives and on timing of the sterilization (postpartum versus interval) also are included in the analysis. These characteristics provide a profile of the women who utilize sterilization as a con-

traceptive method in a given country. By monitoring these statistics over time, we can examine changes in the population of sterilization users.

Age and Number of Children at Sterilization

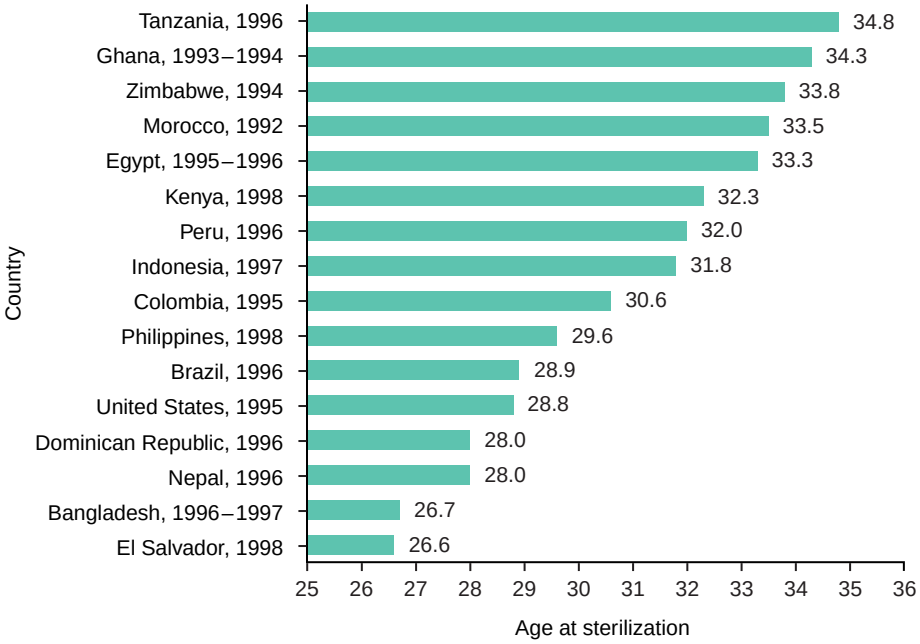
A woman's age and her number of living children at the time of sterilization are important factors in the choice of this method. Age can be closely associated with parity in a couple's decision to end childbearing, as they must consider their current family size and the demand for more children against the risks of pregnancy at older ages and their ability to care for a larger family (Rutenberg & Landry, 1993). Couples who choose sterilization at an early age maximize the duration of protection and the number of births averted during their reproductive years.

Median age at sterilization

The median age at sterilization for female users is slightly lower in selected countries of Asia, Latin America and the Caribbean, and North America than among countries in Africa (Figure 3.1). In Latin America and the Caribbean, the median ages range from 26.6 in El Salvador (1998) to 32.0 in Peru (1996). In East and South Asia, the median ages range from 26.7 in Bangladesh (1996–1997) to 31.8 in Indonesia (1997). For North America, the median age in the United States is 28.8 (1995). In North Africa and Sub-Saharan Africa, the median ages range from 32.3 in Kenya (1998) to 34.8 in Tanzania (1996).

Across the selected countries, sterilization prevalence and age at sterilization are inversely related. For example, in Brazil, the Dominican Republic, and El Salvador, the median age at sterilization is low (below 29) and the overall prevalence of sterilization is high (above 25%), while in Ghana, Egypt, Indonesia, and Peru, the median age is relatively high (32 and older) and prevalence is low (less than 10%). This may be explained in terms of the laws and requirements that regulate age at sterilization (see Chapter 4) or in terms of a sterilization program's maturity. (Mature programs can be characterized as those in which sterilization services are a major component of the national family planning program, and in which access is not restricted by legal or social barriers.) In coun-

Figure 3.1. Median age at sterilization among female sterilization users, by country



tries where the family planning and sterilization programs are mature, rates may be higher because of greater availability of services, and age at sterilization will be younger to the extent that a greater proportion of couples in these countries desire smaller families (Rutenberg & Landry, 1993). These factors combine to increase sterilization prevalence as more women enter the sterilization pool at progressively younger ages than exit at the end of their childbearing years.

Globally, while the prevalence of sterilization among women in union has increased over the past 5–10 years, the median age at sterilization has remained relatively constant. Many changes within individual countries have been slight (less than 0.5 years); the greatest differences occurred in Brazil, where the median age at sterilization dropped from 30.1 in 1986 to 28.9 in 1996, and in Tanzania, where it rose from 33.0 in 1991 to 34.8 in 1996. Of 17 selected countries, only Tanzania and Zimbabwe experienced increases in the median age at sterilization, while in most other countries the median age decreased (Supplement 3.1).

If the median age at sterilization remains generally constant while sterilization prevalence increases, this can indicate that a sterilization program is still maturing and therefore gaining new users at both ends of the reproductive age range. Alternatively, in countries with mature and stable sterilization programs, it can indicate that there may be a popularly accepted or practiced age at sterilization, yet the country's population momentum leads to increased prevalence, as large numbers of women reach that median age and choose sterilization. Countries with a relatively stable median age at sterilization and increasing sterilization prevalence include Colombia, the Dominican Republic, Egypt, Kenya, and Peru (see Supplement 3.1).

Cohort trends

Examining age cohorts of women in selected countries can help us understand changes in sterilization adoption and prevalence in each age category. The unit of analysis in this section is the five-year age cohort, which is simply *all* women aged 15–49, grouped into five-year age-groups (15–19, 20–24, and so on) at the time of the survey. For each age cohort, data have been compiled on the percentage of women sterilized by the exact age of 20, 25, 30, 35, 40, and 45. Comparisons can be made across these groups to determine whether the pace at which younger women are adopting sterilization differs from that of their predecessors, and whether sterilization prevalence is increasing in particular age categories.[1]

Trends in sterilization prevalence for successive cohorts are determined by four factors (Rutenberg & Landry, 1993). Three of these relate to the specific age cohorts: the availability of sterilization services when women in each age-group seek them, the annual sterilization adoption rate, and the age at which couples seek sterilization. The fourth factor is related to an important characteristic of the method: Sterilization provides continuous contraceptive protection, from the time of the procedure through the remainder of the childbearing years (barring method failure). The first three factors are interrelated: Sterilization rates are higher in countries where services are well established (i.e., where services are more available) and where age at sterilization tends to be lower (as couples desire smaller families). Together, all four factors contribute to a steady growth in sterilization prevalence rates, as more women enter the pool of users at younger ages than exit the pool at the end of their childbearing years (Rutenberg & Landry, 1993).

The cohort data from recent country surveys[2] (Supplement 3.2, page 82) provide levels of sterilization adoption for each current age-group, over several different sur-

[1] For women now aged 45–49, past patterns can be traced at every exact age, whereas for younger women such patterns cannot be fully examined (e.g., women now aged 25–29 can only be traced back to exact ages 20 and 25). Therefore, some lines in figures in this chapter (e.g., Supplement 3.2) are shorter than others.

[2] Bangladesh, Brazil, Dominican Republic, Egypt, El Salvador, India, Kenya, Nepal, Tanzania, and the United States.

veys. In countries where sterilization prevalence is greater than 25%, such as Brazil and the Dominican Republic, the proportion of women who have been sterilized by any exact age is higher than that of each previous (older) group, resulting in an overall increase in sterilization prevalence. This trend can be attributed to mature sterilization programs and higher rates of sterilization among younger women (Rutenberg & Landry, 1993). For example, in Brazil in 1996, 10% of women aged 45–49 at the time of the survey had been sterilized by age 30, while the comparable proportions among women aged 40–44 and 35–39 were 22% and 25%, respectively; 30% of women aged 30–34 had been sterilized by age 30.

In other high-prevalence countries such as El Salvador and the United States, younger cohorts follow much the same path of sterilization adoption as older cohorts in the most recent surveys, resulting in stable sterilization prevalence rates. Cohort data from multiple surveys in El Salvador indicate that with time, the rapid increase in sterilization prevalence among successively younger cohorts stabilized and the time patterns came into agreement, at a high level (Figure 3.2, page 70).

Some countries with moderate sterilization prevalence levels (more than 5%) have also experienced rising patterns among successively younger cohorts, although to a smaller degree than the high-prevalence countries. In Nepal, 1% of women now aged 45–49 had been sterilized by age 30, compared with 5% of those aged 40–44, 10% of women aged 35–39, and 12% of women aged 30–34 (Supplement 3.2). Other countries with moderate prevalence, such as Bangladesh and Kenya, show more random patterns of adoption from one cohort to the next.

In countries with very low sterilization prevalence (less than 5%), prevalence among cohorts follows the same path at younger ages and rises only at older ages. In Tanzania, a substantial difference in cohort prevalence is not noted until age 40 (Supplement 3.2). With this pattern, total sterilization prevalence may increase very slowly, as many sterilized women age out of their reproductive years shortly after having the procedure (Rutenberg & Landry, 1993).

Number of living children

The basis for measuring trends in family size is the woman's number of living children at the time of the survey, rather than her parity (i.e., her total number of births). This is necessary because the number of living children may not necessarily reflect the number of births. Similar patterns in family size have emerged in countries within the same region, suggesting that societal as well as individual factors influence a couple's demand for children and, subsequently, their demand to end childbearing through the use of sterilization. For example, common patterns in Africa, Asia, and Latin America and the Caribbean are shown in Figure 3.3 (page 71) and display the percentage distribution of female sterilization users by number of living children.

For the selected countries, approximately 50% of sterilized women in Asia and in Latin America and the Caribbean have 3–4 children. The one exception is China, with its strict population policy during the 1980s, where more than 50% of sterilization users have 0–2 children. A similar pattern was found for the United States (not shown), where more than 50% of users have 0–2 children. North African and Sub-Saharan African countries present a very different trend, with more than 50% of sterilization users having five or more children.

Changes in family size

In examining the family size patterns of sterilization users over time, we find that countries in Asia and in Latin America and the Caribbean where there have been two or more surveys show a slight decline in family size at the time of sterilization (Supplement 3.1). This trend may be explained by a general decline in desired family size (resulting in a higher proportion of couples choosing sterilization once they have completed their families) and by the movement of older sterilization users (who often had higher numbers

Figure 3.2. Percentage of women sterilized by selected exact ages, by various cohorts, El Salvador, 1985, 1993, and 1998

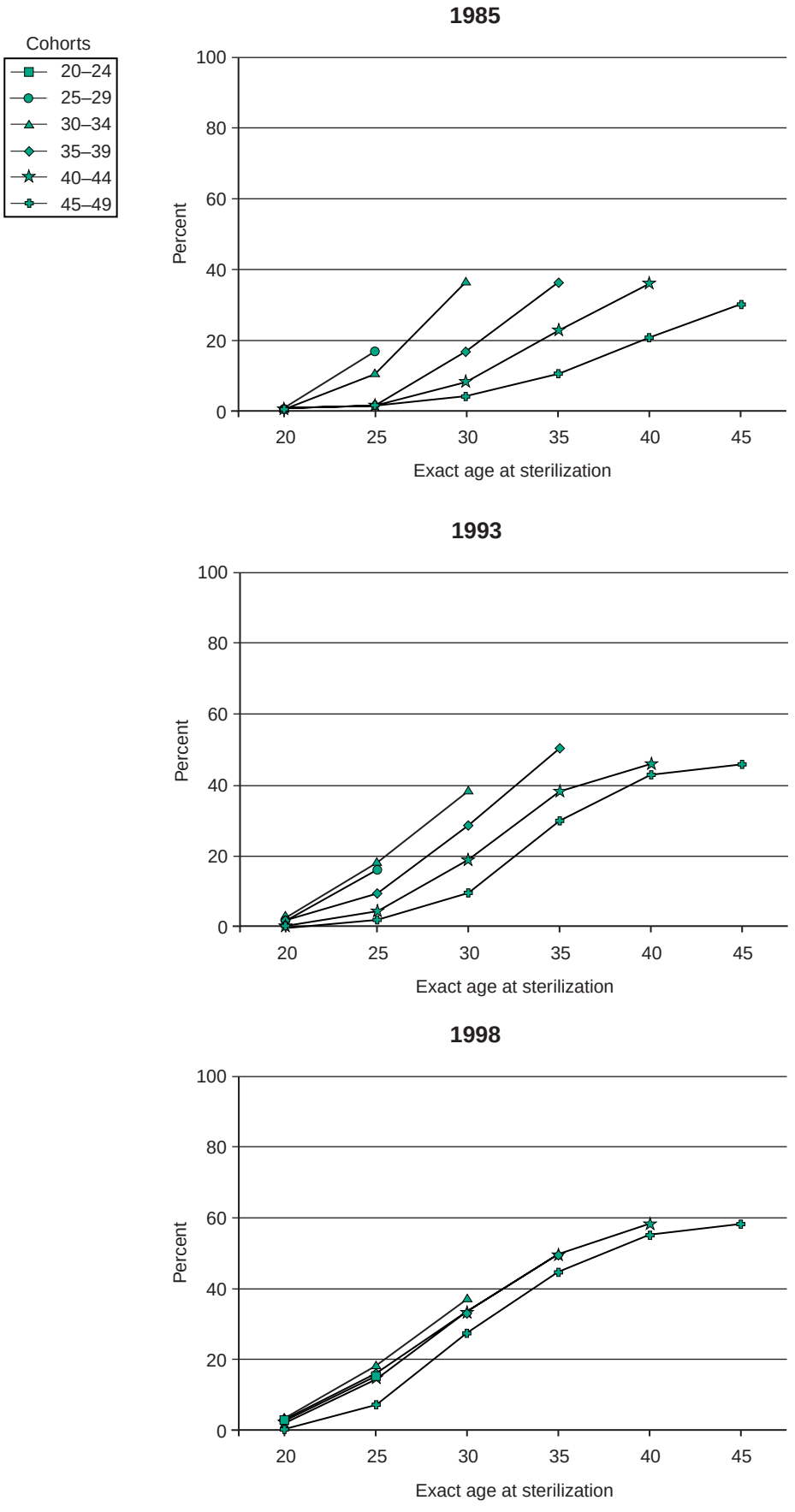
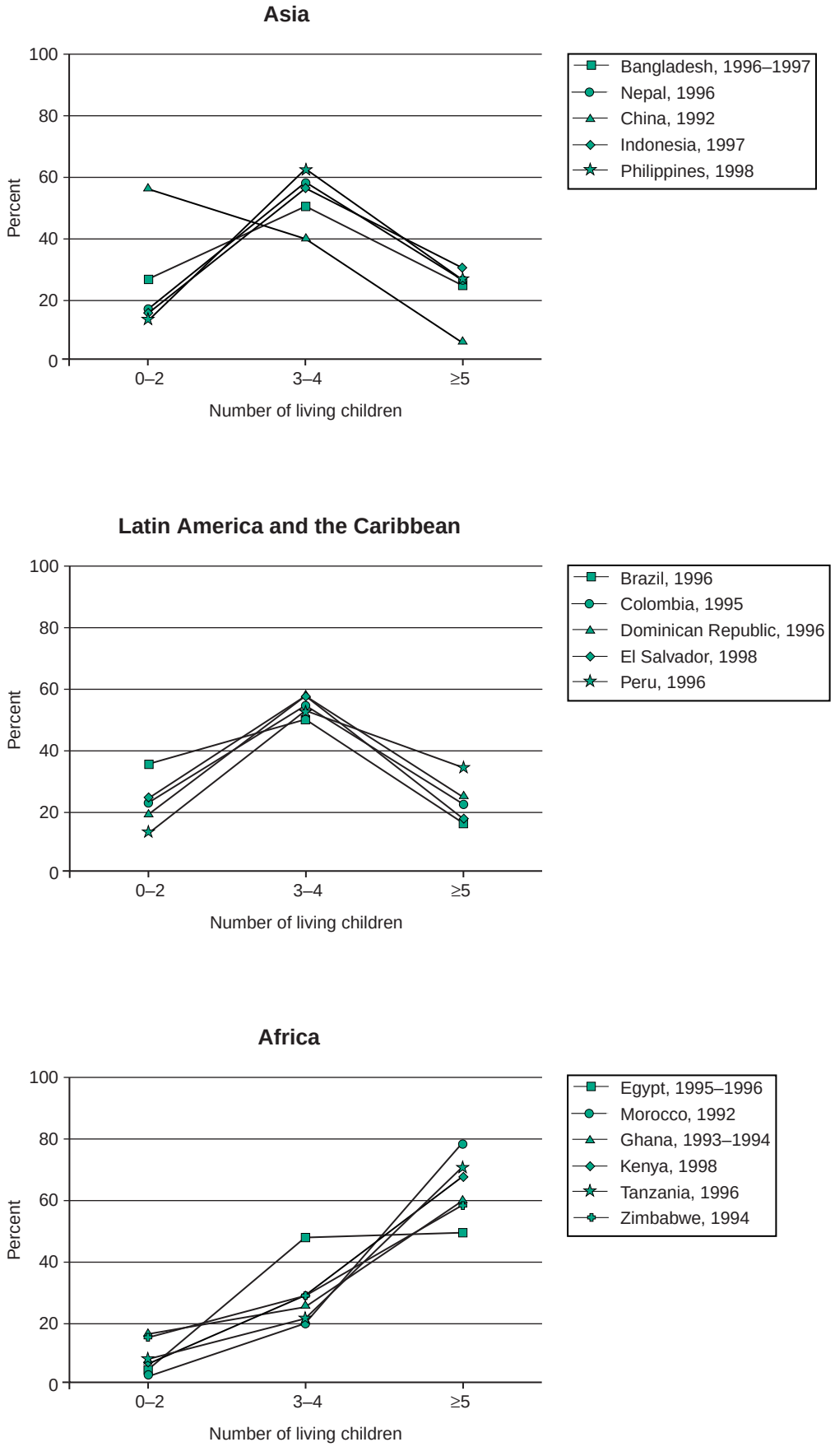


Figure 3.3. Percentage of women using female sterilization, by family size, according to region



of children) out of their childbearing years between surveys (Rutenberg & Landry, 1993). Trends in North Africa and Sub-Saharan Africa contrast with those in Asia and in Latin America and the Caribbean; in the former regions, either very little change has occurred or the number of living children has slightly increased.

Educational Attainment

Information on educational attainment was collected for female sterilization users in each of the selected countries. However, it is difficult to generalize about patterns in sterilization prevalence by educational level. In an analysis of 23 countries, Ross (1992) found no consistent trends associated with either low or high prevalence. This may be because educational categories are defined differently by country. Further, there are no clear patterns across countries relating levels of education among sterilization users to those among women using other contraceptive methods.

While definitions of educational level differ across countries, the data presented here are based on the standard Demographic and Health Survey education categories: none, primary, secondary, and postsecondary. Educational attainment, although not a *predictor* of sterilization use, is a useful descriptive characteristic that illustrates by proxy the socioeconomic status of sterilization users in a given country or region.

Worldwide, available data show that many female sterilization users have attained at least a primary education (Supplement 3.1). As would be expected for North America and for all developed countries where the level of education is generally high, most sterilization users in the United States have either a secondary or a postsecondary education. In East Asia and in Latin America and the Caribbean, the majority of users have either a primary or a secondary education, while in Sub-Saharan Africa, most users have attained a primary education. Sterilization users with the lowest levels of formal education are found in North Africa and South Asia, where the majority of users have no education (Figure 3.4).

Figure 3.4. Percentage distribution of women using female sterilization, by level of education, according to country

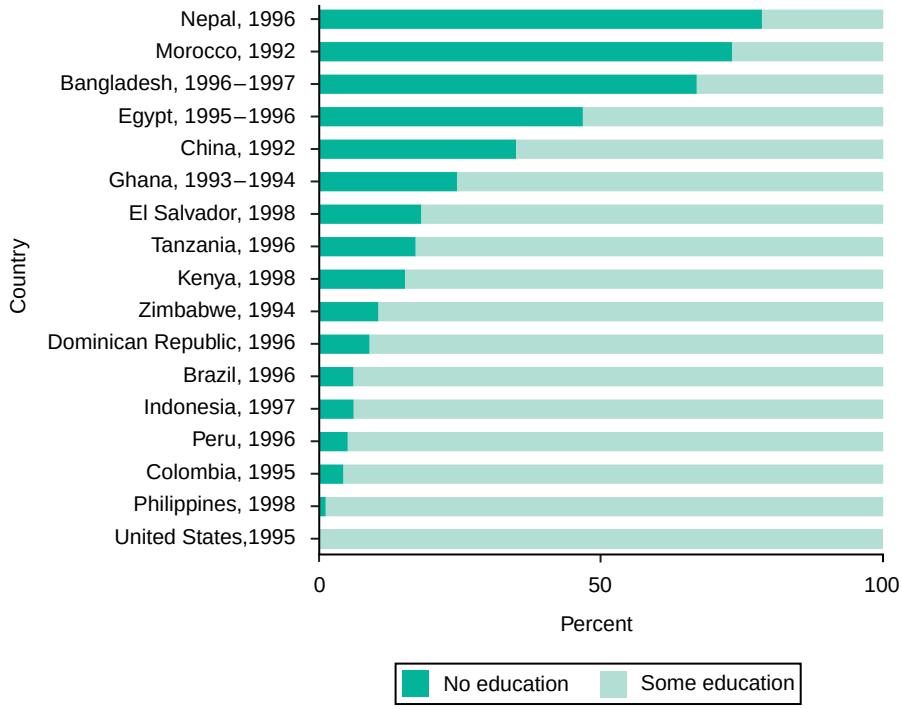
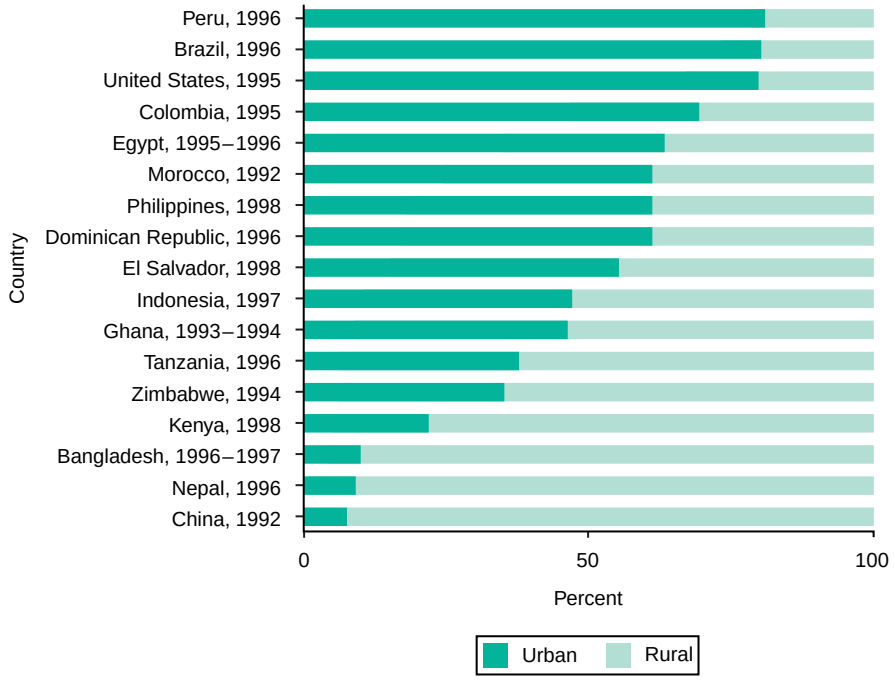


Figure 3.5. Percentage distribution of women using female sterilization, by urban-rural residence, according to country



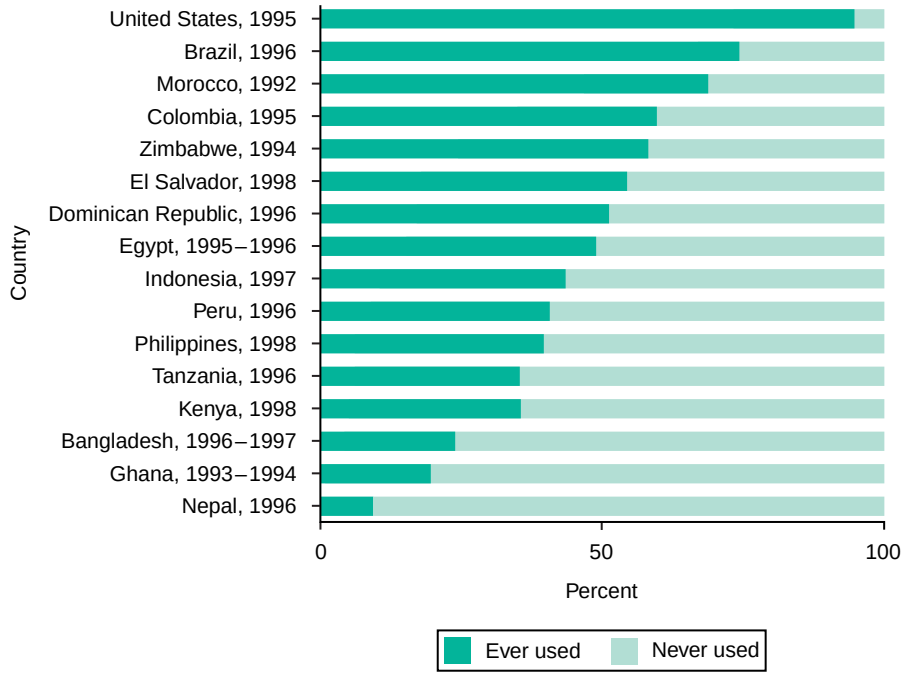
Urban-Rural Residence Patterns

In countries where sterilization programs are either relatively weak or still maturing, sterilization use may be expected to be higher in urban areas, where access to medical facilities and trained personnel is greater. In contrast, in countries that have stronger or more stable programs, sterilization use in rural areas often approximates that in urban areas (Ross, 1992). By virtue of their area of residence and their proximity to medical facilities, urban women often have access to a broader range of contraceptive methods than their rural counterparts. However, since rural women may find it difficult or burdensome to travel to a service-delivery point on a regular basis to obtain a temporary contraceptive method, sterilization may become an attractive option for rural couples who have reached their desired family size. Moreover, technological advances resulting in simpler sterilization techniques and greater programmatic outreach (such as mobile units) have made contraceptive sterilization even easier to obtain in rural areas (Ross, Hong, & Huber, 1985).

As shown in Supplement 3.1, there are 16 countries in which more than 50% of women using sterilization live in rural areas.[3] The residential location of female sterilization users varies between regions (Figure 3.5). In Asian and Sub-Saharan African countries, most sterilization users reside in rural areas, while in selected nations from Latin America and the Caribbean, North Africa, and North America, the majority live in urban locales. This pattern mostly follows the distribution of the general population, as is indicated in a residential breakdown of survey respondents in selected Demographic and Health Surveys (data not shown).

[3] Bangladesh, Cape Verde, China, Ghana, Haiti, India, Indonesia, Jamaica, Kenya, Mauritius, Nepal, Paraguay, Sri Lanka, Tanzania, Trinidad and Tobago, and Zimbabwe.

Figure 3.6. Percentage distribution of women using female sterilization, by use of modern methods prior to sterilization, according to country



Use of Modern Contraceptives Prior to Sterilization

Ever-use of modern contraceptives[4] provides a crude measure of the extent to which a given population has experimented with modern family planning methods. Such use varies between countries and is affected by numerous factors, including the demand to postpone or space childbearing, local preferences, access to service-delivery points, availability of methods, and cost. As a result, low use of modern contraceptives prior to sterilization may be related to limited availability of modern methods (which leads to heavy reliance on traditional methods), a strong sterilization program coupled with a weak family planning program, or a recent surge in demand for fertility control and family planning (Rutenberg & Landry, 1993).

For many women, sterilization is the first and only modern contraceptive method that they or their partners ever use (Landry, 1990). In eight of 16 countries, more than 50% of female sterilization users never used a modern contraceptive prior to sterilization (Figure 3.6). Countries where sterilization users have low levels of ever-use of modern methods are not limited to one region; they include Bangladesh, Ghana, Indonesia, Kenya, Nepal, Peru, the Philippines, and Tanzania.

Countries where more than 50% of sterilization users had ever used a modern contraceptive prior to the procedure include Brazil, Colombia, the Dominican Republic, Egypt, El Salvador, Morocco, the United States, and Zimbabwe. High levels of modern method use before sterilization could have a variety of explanations: First, the sterilization program may be weak. Alternatively, there may be high demand for fertility control, but restrictions on access to sterilization may lead people to use alternate methods until they decide to use sterilization. Finally, the family planning program could respond to the changing needs of the population at different stages in the reproductive life cycle, with temporary methods for those who desire to space births and sterilization for those who have completed their desired family size.

[4] Oral contraceptives, the intrauterine device (IUD), injectables, vaginal barrier methods, the condom, and Norplant implants.

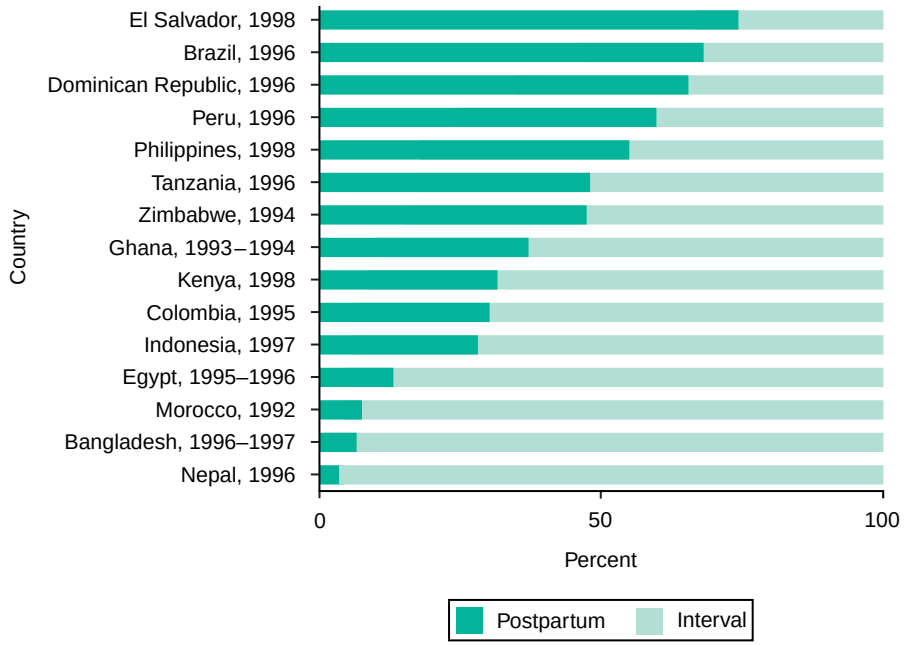
Sterilization Timing: Postpartum Versus Interval

Several factors affect the decision to have a postpartum sterilization (a sterilization procedure performed within the 42-day period following delivery) or an interval sterilization (a sterilization procedure performed at any other time). These include the type of sterilization technique commonly practiced, restrictions on who can obtain sterilization services, the accessibility of a hospital or clinic, the proportion of deliveries occurring in a hospital or clinic, the prevalence of cesarean deliveries, and attendance at antenatal services that include counseling on family planning methods (Rutenberg & Landry, 1993). The choice of postpartum or interval sterilization may also be related to type of insurance, especially if private insurance companies offer greater flexibility with regard to the timing of the sterilization (Miller, Shain, & Pasta, 1991). Postpartum sterilization is relatively easy to perform, because of the positioning of the tubes, and is convenient for women who have hospital deliveries. Interval sterilization may be more convenient for women who give birth at home, especially for those living in rural areas who have limited access to hospital-based maternity services (Chapter 6).

Figure 3.7 shows the proportion of women who have had postpartum and interval procedures in the selected countries. Interval procedures tend to outweigh postpartum sterilizations among countries located in North Africa, South Asia, and Sub-Saharan Africa. Postpartum sterilizations, however, are considerably more common than interval procedures among countries in Latin America and the Caribbean (with the exception of Colombia). In the United States, half of female sterilization procedures performed on an annual basis are postpartum (MacKay et al., 2001). Restrictive policies toward interval procedures in some countries may lead to a high level of postpartum sterilization (Chi & Thapa, 1993). For example, before its liberalization in 1997, the law regarding sterilization in Brazil was fairly restrictive, such that women were allowed to obtain the procedure only after a cesarean section (Faundes & Cecatti, 1993). (Laws and regulations surrounding sterilization are discussed in Chapter 4.)

The prevalence of either postpartum or interval sterilization has increased notably in recent years in a few countries (Supplement 3.1). The proportion of sterilizations per-

Figure 3.7. Percentage distribution of women using female sterilization, by timing of sterilization, according to country



formed postpartum has increased in Colombia, El Salvador, and the Philippines, while the relative share of interval procedures has increased in both Egypt and Peru. Countries with high levels of interval procedures may want to consider introducing postpartum sterilization, since it is generally more convenient for the client and is less costly to the program. Country programs that emphasize postpartum procedures, however, must ensure clients' informed choice and consent before they experience the stress of labor (Rutenberg & Landry, 1993).

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Supplement 3.1. Selected characteristics of women using contraceptive sterilization, by country, year, and source of data

Country/year/source	Prevalence	Number of living children			Median age at sterilization	Educational level				Residence		Ever used modern contraceptives prior to sterilization		Timing of sterilization	
		0–2	3–4	≥5		None	Primary	Secondary	Post-secondary	Urban	Rural	Yes	No	Postpartum	Interval
Bangladesh, 1993–1994 (DHS)	9.2	23.9	49.0	27.1	27.0	73.3	19.9	5.9	0.9	9.4	90.6	22.1	77.9	6.8	93.2
Bangladesh, 1996–1997 (DHS)	8.7	26.4	49.5	24.0	26.7	68.3	24.2	6.0	1.5	11.9	88.1	25.0	75.0	8.9	91.1
Belize, 1991 (CDC)*	18.7	12.1	38.8	49.1	28.4	6.3	73.9	13.7	6.1	76.5	23.5	58.0	42.0	MD	MD
Bolivia, 1989 (DHS)	4.4	11.2	46.4	42.4	31.3	5.2	46.1	35.6	13.1	76.8	23.2	33.8	66.2	78.2	21.8
Bolivia, 1993–1994 (DHS)	4.6	13.2	53.4	33.4	31.8	6.5	41.0	38.6	13.9	80.8	19.2	40.7	59.3	76.6	23.4
Bolivia, 1998 (DHS)	6.5	9.3	49.2	41.6	31.8	6.3	36.6	57.1†	NA	85.1	14.9	42.1	57.9	74.2	25.8
Brazil, 1986 (DHS)*	27.6	26.6	50.2	23.2	30.1	9.0	71.5	11.9	7.2	82.2	17.8	73.8	26.2	72.4	27.6
Brazil, 1991 (DHS)‡	37.8	22.4	44.4	33.2	29.4	21.6	59.9	14.6	3.9	71.2	28.8	56.7	43.3	65.1	34.9
Brazil, 1996 (DHS)	42.7	34.3	49.9	15.8	28.9	7.9	41.4	45.2	5.5	81.8	18.2	76.0	24.0	69.3	30.7
Cape Verde, 1998 (CDC)	12.9	10.6	31.1	58.3	31.4	29.0	61.0	10.0†	NA	39.3	60.7	65.3	34.7	68.3	31.7
China, 1988 (CDC)	35.0	42.4	45.4	12.2	MD	49.0	32.7	17.8	0.4	7.9	92.1	MD	MD	MD	MD
China, 1992 (CDC)	46.1	54.9	40.1	5.0	MD	35.4	39.0	24.7	0.9	9.8	90.2	MD	MD	MD	MD
Colombia, 1986 (DHS)	18.7	15.7	47.0	37.3	30.6	11.0	64.4	22.0	2.6	71.5	28.5	57.1	42.9	32.6	67.4
Colombia, 1990 (DHS)	21.4	16.9	52.7	30.4	30.7	6.9	55.4	28.8	8.8	71.0	29.0	55.2	44.8	19.4	80.6
Colombia, 1995 (DHS)	26.4	23.0	54.6	22.4	30.6	5.8	49.1	36.9	8.3	71.7	28.3	61.6	38.4	32.8	67.2
Costa Rica, 1993 (CDC)	21.0	91.2	5.6	3.3	31.0	4.0	51.6	26.5	17.9	60.9	39.1	81.9	18.1	56.5	43.5
Dominican Republic, 1986 (DHS)	33.0	13.8	45.9	40.2	28.8	5.5	75.6	13.4	5.5	64.2	35.8	46.7	53.3	70.2	29.8
Dominican Republic, 1991 (DHS)	38.5	16.1	56.2	27.6	28.5	7.0	64.5	19.0	9.2	66.3	33.7	51.7	48.3	63.8	36.2
Dominican Republic, 1996 (DHS)	41.0	18.9	57.2	23.9	28.0	9.5	59.9	19.9	10.6	62.8	37.2	52.7	47.3	67.8	32.2
Ecuador, 1987 (DHS)	15.0	13.1	46.6	40.3	31.0	5.9	55.7	30.2	8.2	65.2	34.8	37.8	62.2	75.3	24.7
Ecuador, 1989 (CDC)	18.3	9.0	50.9	40.1	31.3	4.9	53.9	32.8	8.4	70.3	29.7	51.5	48.5	83.8	16.2
Ecuador, 1994 (CDC)	19.8	14.4	55.1	30.5	30.9	4.3	48.5	35.1	12.1	69.2	30.8	58.9	41.1	83.3	16.7
Ecuador, 1999 (CDC)	22.5	15.2	57.6	27.2	30.2	5.1	46.5	31.6	16.8	68.3	31.7	70.4	29.6	MD	MD
Egypt, 1988–1989 (DHS)	1.5	11.8	45.1	43.1	33.5	41.4	40.4	17.3	0.9	70.6	29.4	63.4	36.6	37.7	62.3
Egypt, 1992 (DHS)	1.1	4.9	36.1	59.0	33.4	59.0	24.6	15.1	1.4	51.3	48.7	53.0	47.0	22.5	77.5
Egypt, 1995–1996 (DHS)	1.1	4.0	46.6	49.4	33.3	47.2	26.8	16.8	9.2	65.2	34.8	50.5	49.5	15.7	84.3
El Salvador, 1985 (DHS)	32.5	22.8	52.1	25.1	27.9	24.4	64.9	8.3	2.4	62.6	37.4	39.3	60.7	64.8	35.2
El Salvador, 1988 (CDC)*	30.2	22.4	58.9	18.7	26.6	22.3	56.3	18.4	3.1	59.7	40.3	49.7	50.3	70.8	29.2
El Salvador, 1993 (CDC)	31.5	25.1	55.3	19.6	27.1	24.3	50.4	21.9	3.4	60.9	39.1	54.1	45.9	69.6	30.4
El Salvador, 1998 (CDC)	33.2	24.2	57.2	18.6	26.6	20.2	45.8	27.4	6.6	58.1	41.9	55.1	44.9	75.9	24.1
Ghana, 1988 (DHS)	1.0	16.2	24.3	59.5	MD	56.8	40.5	2.7†	NA	32.4	67.6	13.5	86.5	MD	MD
Ghana, 1993–1994 (DHS)	0.9	16.2	24.3	59.5	34.3	27.0	54.1	10.8	8.1	45.9	54.1	21.6	78.4	40.5	59.5

(cont'd.)

Supplement 3.1. Selected characteristics of women using contraceptive sterilization, by country, year, and source of data *(cont'd.)*

Country/year/source	Prevalence	Number of living children			Median age at sterilization	Educational level				Residence		Ever used modern contraceptives prior to sterilization		Timing of sterilization	
		0–2	3–4	≥5		None	Primary	Secondary	Post-secondary	Urban	Rural	Yes	No	Postpartum	Interval
Guatemala, 1987 (DHS)*	11.3	10.9	54.3	34.8	29.9	24.7	57.4	17.1	0.8	58.4	41.6	39.5	60.5	34.8	65.2
Guatemala, 1995 (DHS)	15.8	12.7	56.3	31.1	29.5	21.4	52.1	26.5†	NA	59.5	40.5	38.1	61.9	37.1	62.9
Haiti, 1989 (CDC)§	2.5	8.7	23.9	67.4	MD	52.2	34.8	10.9	2.2	39.1	60.9	100.0	0.0	MD	MD
Honduras, 1996 (CDC)	18.2	13.4	50.0	36.6	29.5	12.5	66.9	18.8	1.9	55.9	44.1	63.0	37.0	39.3	60.7
India, 1992–1993 (DHS)	30.7	22.7	56.7	20.6	26.6	56.8	21.3	19.7	1.9	29.0	71.0	4.4	95.6	39.4	60.7
Indonesia, 1987 (DHS)	3.1	10.1	40.5	49.4	32.1	10.3	56.4	29.9	3.5	52.0	48.0	45.3	54.7	MD	MD
Indonesia, 1991 (DHS)	3.3	10.6	52.3	37.1	31.4	10.7	52.2	35.0	2.2	56.2	43.8	42.2	57.8	24.7	75.3
Indonesia, 1994 (DHS)	3.8	10.4	53.5	36.1	31.6	7.0	56.5	32.2	4.3	53.3	46.7	47.3	52.7	29.9	70.1
Indonesia, 1997 (DHS)	3.4	15.0	55.0	30.0	31.8	7.8	52.6	34.5	5.1	47.2	52.8	44.5	55.5	30.7	69.3
Jamaica, 1989 (CDC)§	13.7	13.2	34.2	52.6	30.0	0.0	65.3	27.7	7.0	35.1	64.9	68.9	31.1	MD	MD
Jamaica, 1993 (CDC)*,§	12.5	11.8	88.2	0.0	29.5	0.0	47.7	41.1	11.0	39.7	60.3	83.4	16.6	MD	MD
Jamaica, 1997 (CDC)§	12.3	18.6	43.9	37.5	31.1	0.4	8.8	80.1	10.7	49.6	50.4	79.0	21.0	56.3	43.7
Jordan, 1990 (DHS)‖	5.6	1.6	11.4	87.0	35.1	37.7	36.3	23.2	2.9	82.5	17.5	50.7	49.3	19.2	80.8
Kenya, 1989 (DHS)	4.7	8.2	17.5	74.3	MD	26.4	57.0	15.7	0.3	14.1	85.9	37.3	62.7	MD	MD
Kenya, 1993 (DHS)	5.6	4.4	20.4	75.2	33.0	23.6	56.3	19.6	0.5	16.7	83.3	40.3	59.7	34.8	65.2
Kenya, 1998 (DHS)	6.2	5.9	27.3	66.8	32.3	17.2	54.5	26.2	2.1	22.9	77.1	36.5	63.5	34.5	65.5
Mauritius, 1985 (CDC)#	4.7	10.6	47.2	42.3	31.9	22.5	68.3	9.2	0.0	47.2	52.8	83.8	16.2	44.4	55.6
Mauritius, 1991 (CDC)*	7.0	23.2	59.1	17.7	30.1	12.2	60.6	26.8	0.4	59.8	40.2	85.4	14.6	30.3	69.7
Mexico, 1987 (DHS)	19.4	14.1	46.0	39.9	30.7	9.2	65.7	21.9	3.2	MD	MD	54.8	45.2	66.8	33.2
Moldova, 1997 (CDC)*	3.4	72.8	24.5	2.6	27.9	0.6	0.6	60.1	38.7	55.8	44.2	48.3	51.7	50.3	49.7
Morocco, 1987 (DHS)	2.2	5.7	22.1	72.1	34.4	74.6	16.4	7.4	1.6	73.8	26.2	69.7	30.3	13.9	86.0
Morocco, 1992 (DHS)	3.0	2.0	19.9	78.1	33.5	73.5	19.9	6.0	0.7	62.9	37.1	70.9	29.1	9.9	90.1
Namibia, 1992 (DHS)	7.6	20.8	37.5	41.7	32.5	16.9	36.5	40.2	6.4	69.4	30.6	48.3	51.7	49.7	50.3
Nepal, 1996 (DHS)	17.5	16.4	58.2	25.4	28.0	79.5	12.4	7.9	0.2	11.4	88.6	10.7	89.3	5.8	94.2
Nicaragua, 1992–1993 (CDC)	18.8	20.7	47.3	32.0	29.0	16.7	55.5	22.5	5.2	66.9	33.1	65.9	34.1	43.3	56.7
Nicaragua, 1997–1998 (DHS)	26.6	16.1	45.8	38.1	29.5	18.5	48.0	28.9	4.6	68.7	31.3	59.4	40.6	41.6	58.4
Panama, 1984 (CDC)	32.4	16.2	47.6	36.2	29.4	4.8	56.4	33.5	5.2	53.4	46.6	MD	MD	52.7	47.3

(cont'd.)

Supplement 3.1. Selected characteristics of women using contraceptive sterilization, by country, year, and source of data *(cont'd.)*

Country/year/source	Prevalence	Number of living children			Median age at sterilization	Educational level				Residence		Ever used modern contraceptives prior to sterilization		Timing of sterilization	
		0–2	3–4	≥5		None	Primary	Secondary	Post-secondary	Urban	Rural	Yes	No	Postpartum	Interval
Paraguay, 1987 (CDC)	4.0	16.1	53.8	30.1	30.3	3.0	61.0	26.3	9.7	36.4	63.6	78.8	21.2	12.7	87.3
Paraguay, 1990 (DHS)	7.4	19.4	42.7	37.9	32.3	3.9	64.9	23.9	7.3	62.2	37.8	44.3	55.7	62.2	37.8
Paraguay, 1995–1996 (CDC)	6.8	14.2	48.4	37.4	31.1	5.2	60.7	25.0	9.0	52.4	47.6	68.7	31.3	72.6	27.4
Paraguay, 1998 (CDC)	8.0	16.1	53.9	30.0	31.4	6.6	63.3	22.3	7.7	48.1	51.9	71.5	28.5	76.1	23.9
Peru, 1986 (DHS)	6.1	7.0	42.2	50.8	31.9	10.8	49.7	28.1	11.4	82.7	17.3	25.4	74.6	74.6	25.4
Peru, 1991–1992 (DHS)	8.0	14.1	47.7	38.2	32.0	5.1	36.4	35.2	23.3	87.6	12.4	38.9	61.1	73.5	26.4
Peru, 1996 (DHS)	9.7	12.9	53.4	33.7	32.0	6.2	38.4	36.5	18.9	82.2	17.8	42.2	57.8	60.6	39.4
Philippines, 1993 (DHS)	12.3	11.2	58.1	30.6	29.7	0.8	37.8	35.2	26.2	61.7	38.3	32.9	67.1	51.2	48.8
Philippines, 1998 (DHS)	10.4	12.8	61.7	25.5	29.6	0.8	33.1	34.6	31.5	62.8	37.2	41.3	58.7	57.9	42.1
Puerto Rico, 1995–1996 (CDC)	48.7	33.4	58.9	7.7	27.0	0.4	9.3	54.5	35.8	MD	MD	83.1	16.9	56.9	43.1
Romania, 1999 (CDC)*	2.5	78.0	17.8	4.1	25.1	1.0	17.9	71.3	9.8	58.3	41.7	38.9	61.1	38.1	61.9
Sri Lanka, 1987 (DHS)	29.8	12.0	54.0	34.0	30.0	14.2	39.4	34.0	12.3	15.5	84.5	15.9	84.1	MD	MD
Swaziland, 1988 (CDC)	5.0	11.1	26.7	62.2	32.0	20.0	41.1	34.4	4.4	MD	MD	43.3	56.7	MD	MD
Tanzania, 1991–1992 (DHS)	1.6	19.6	25.4	55.0	33.0	23.2	69.9	6.9†	NA	26.1	73.9	37.6	62.4	52.4	47.6
Tanzania, 1996 (DHS)	1.9	7.3	21.8	70.9	34.8	18.7	70.6	10.7†	NA	38.6	61.4	36.6	63.4	49.8	50.2
Thailand, 1987 (DHS)	28.5	32.9	48.2	18.9	29.0	8.3	80.3	7.1	4.3	21.8	78.2	50.6	49.4	MD	MD
Trinidad and Tobago, 1987 (DHS)	8.4	14.9	43.4	41.7	32.2	0.4	69.7	29.4	0.4	43.9	56.1	66.7	33.3	39.9	60.1
Tunisia, 1988 (DHS)	11.5	4.6	28.7	66.7	33.1	75.9	18.7	5.2	0.2	57.4	42.6	36.3	63.7	12.2	87.8
Turkey, 1993 (DHS)	2.9	30.4	47.0	22.6	31.8	33.4	50.8	12.0	3.9	72.6	27.4	41.9	58.1	40.4	59.6
Ukraine, 1999 (CDC)*	1.4	90.7	9.3	0.0	28.6	0.0	4.4	41.0	54.6	64.8	35.2	52.5	47.5	52.1	47.9
United States, 1988 (Survey)*,§	36.3	55.4	44.6	MD	29.0	NA	20.8	44.3	34.9	62.7	37.3	95.7	4.3	MD	MD
United States, 1995 (Survey)*,§	38.7	53.5	46.4	MD	28.8	NA	25.1	42.1	32.8	81.3	18.7	96.6	3.4	MD	MD
Zambia, 1992 (DHS)	2.1	18.8	13.6	67.7	34.2	15.4	44.1	28.0	12.5	71.5	28.5	36.8	63.2	58.2	41.8
Zambia, 1996–1997 (DHS)	2.0	7.9	18.0	74.1	35.9	9.4	48.6	31.7	10.2	65.2	34.8	47.7	52.3	50.5	49.5
Zimbabwe, 1988–1989 (DHS)	2.5	12.7	28.2	59.2	33.2	15.5	46.5	35.2	2.8	47.9	52.1	62.0	38.0	45.1	54.9
Zimbabwe, 1994 (DHS)	2.5	13.7	28.1	58.2	33.8	11.8	60.6	25.0	2.6	36.1	63.9	59.8	40.2	48.6	51.4

* Data refer to ages 15–44.

† Data include both secondary and higher education level.

‡ Data are limited to Northeastern Brazil.

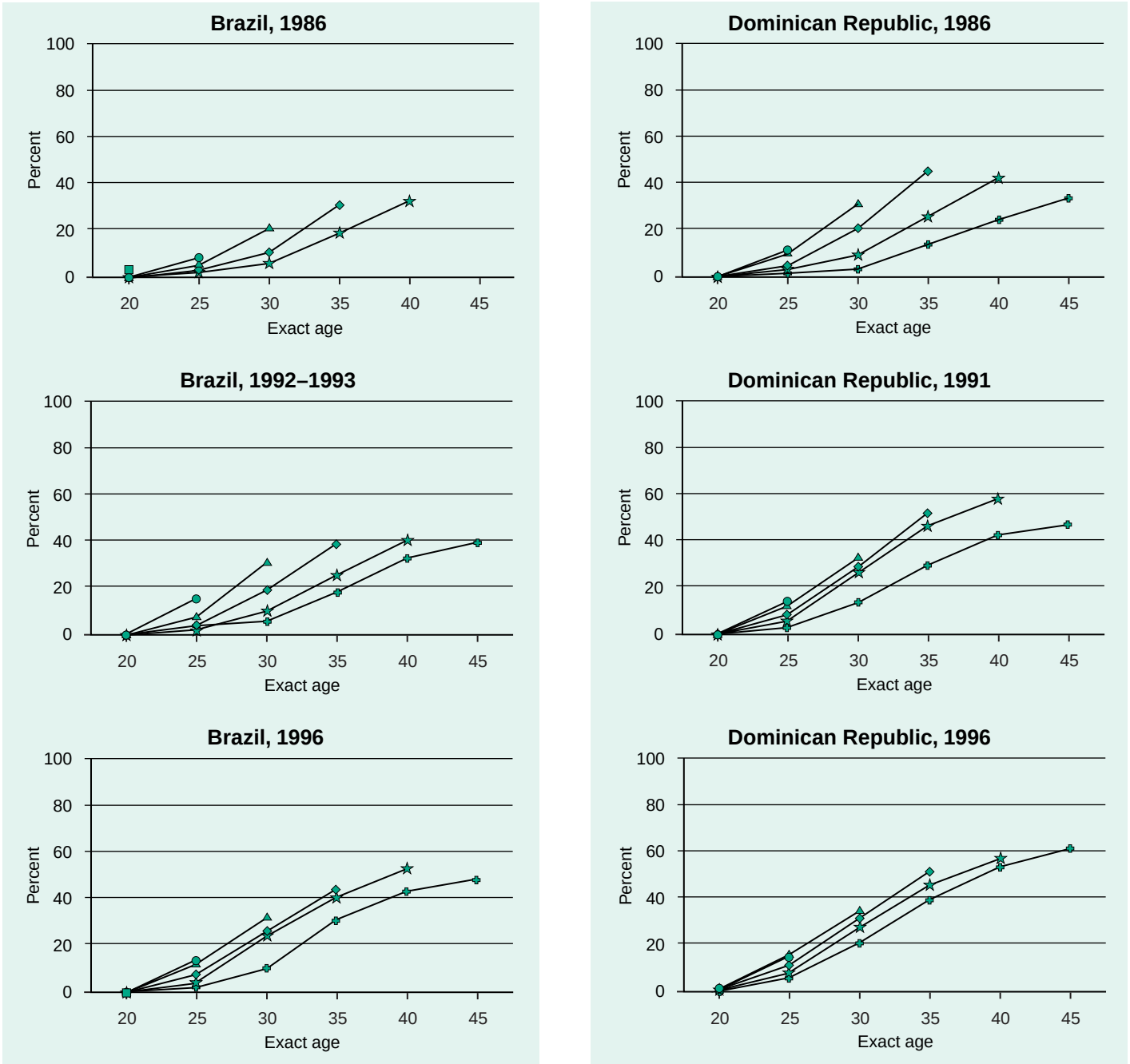
§ Data refer to number of live births.

‖ Excludes the West Bank.

Data are not weighted.

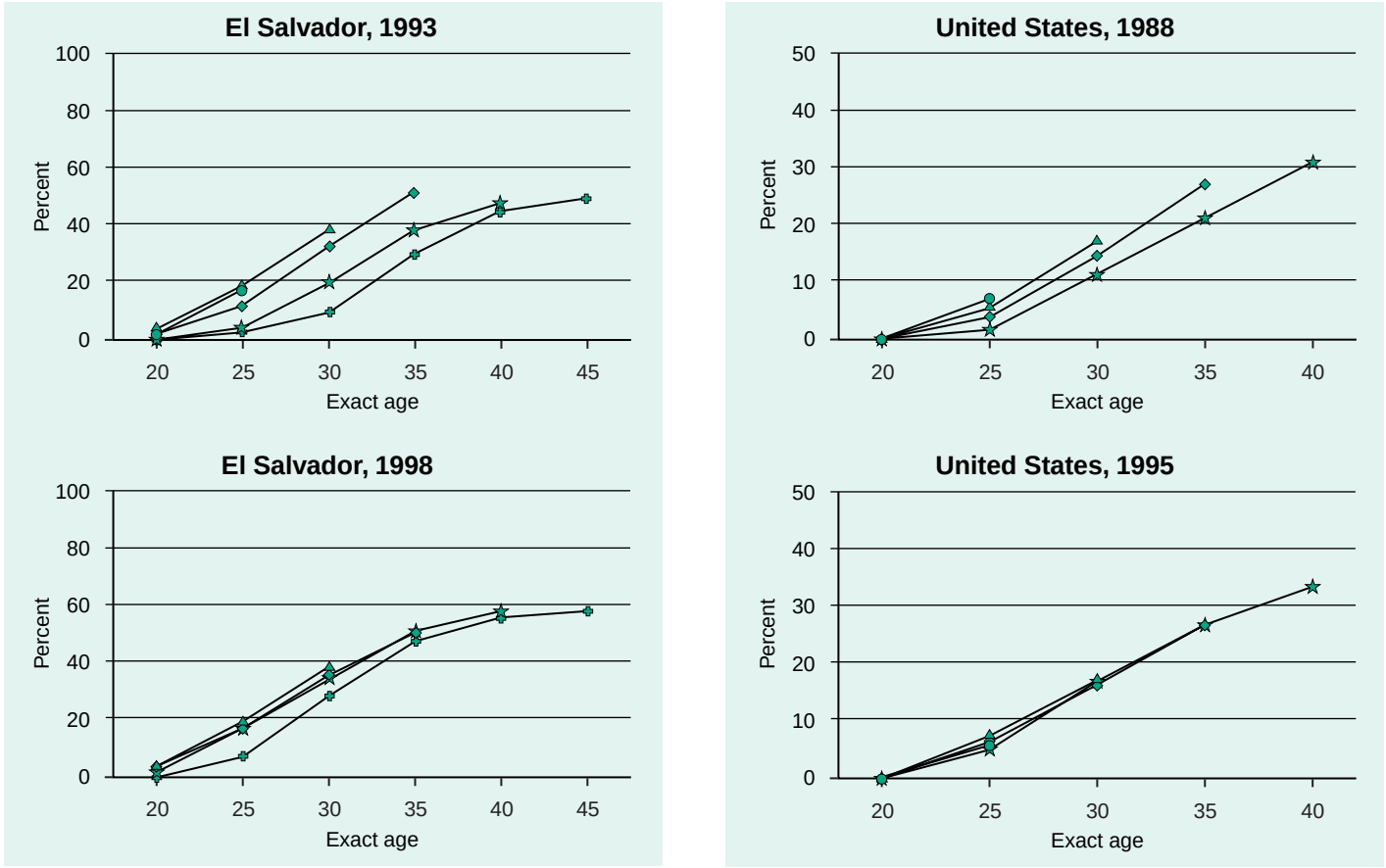
Notes: MD = missing characteristics data; NA = not applicable.

Supplement 3.2. Percentage sterilized by exact age, among various cohorts, selected countries



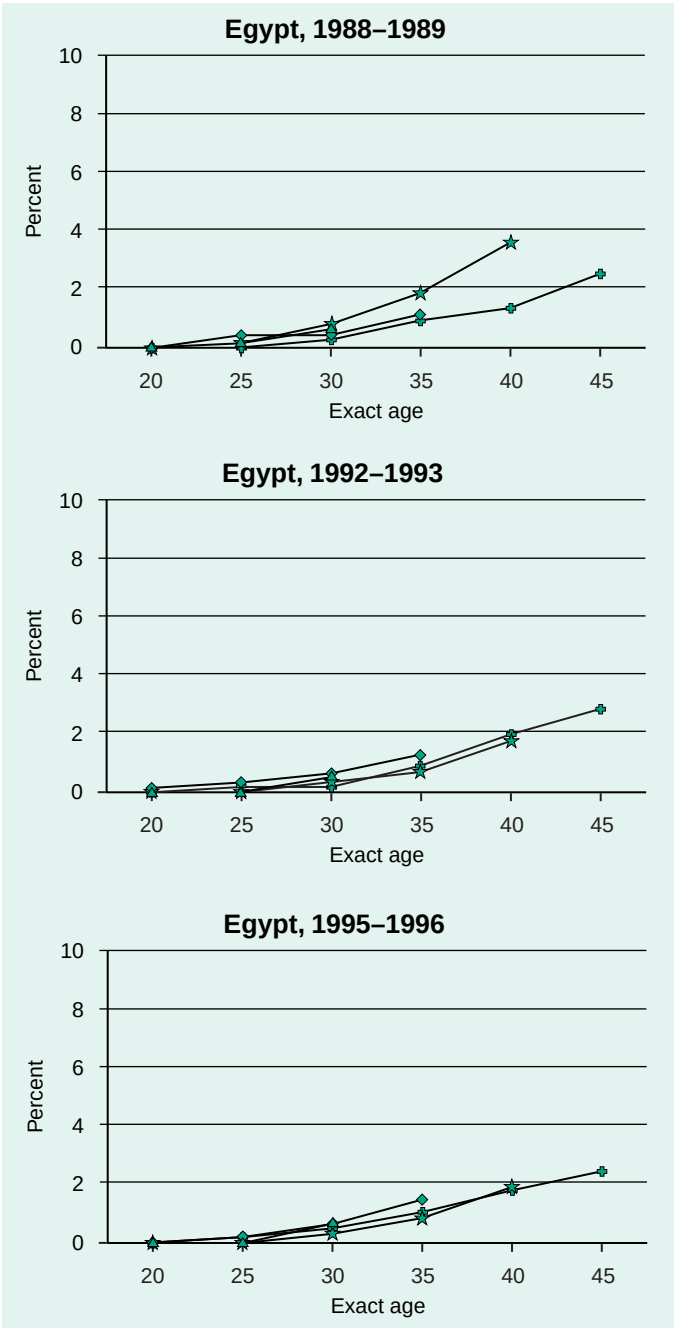
(cont'd.)

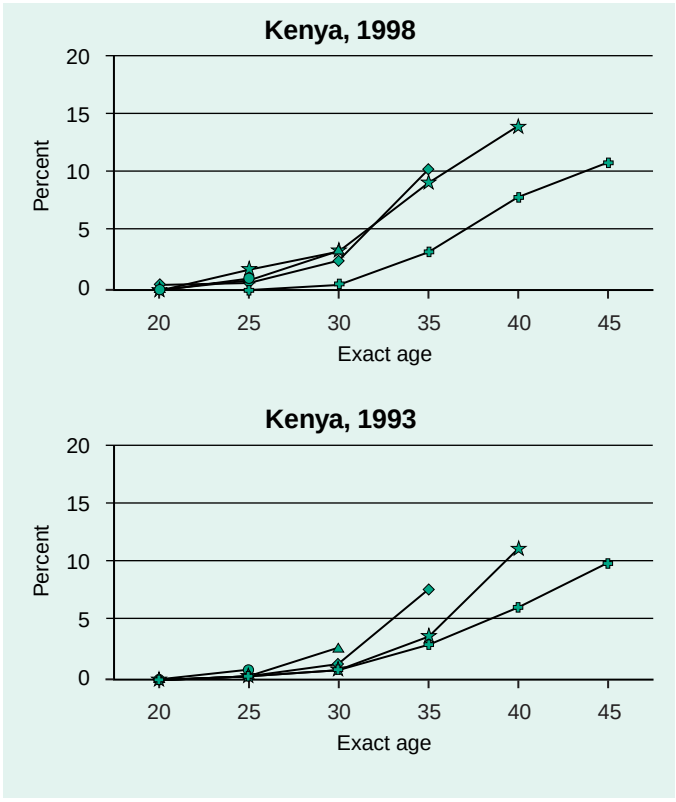
Supplement 3.2. Percentage sterilized by exact age, among various cohorts, selected countries *(cont'd.)*

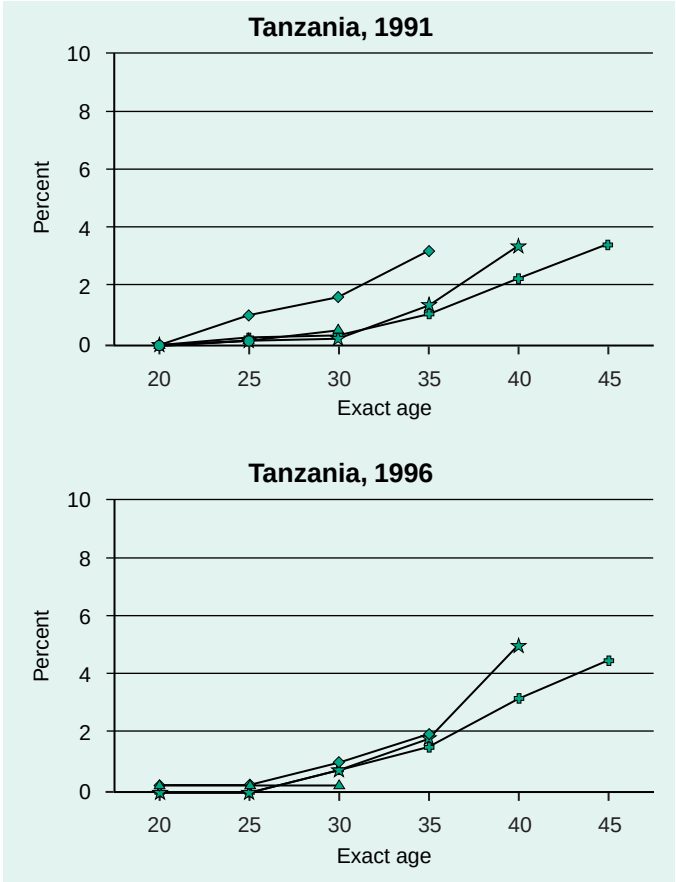


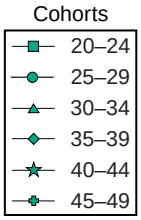
(cont'd.)

Supplement 3.2. Percentage sterilized by exact age, among various cohorts, selected countries *(cont'd.)*



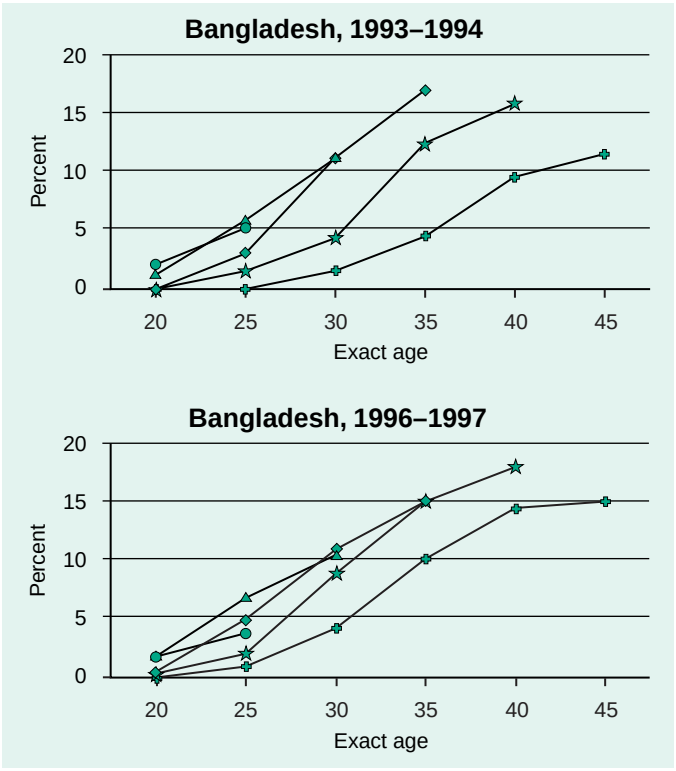


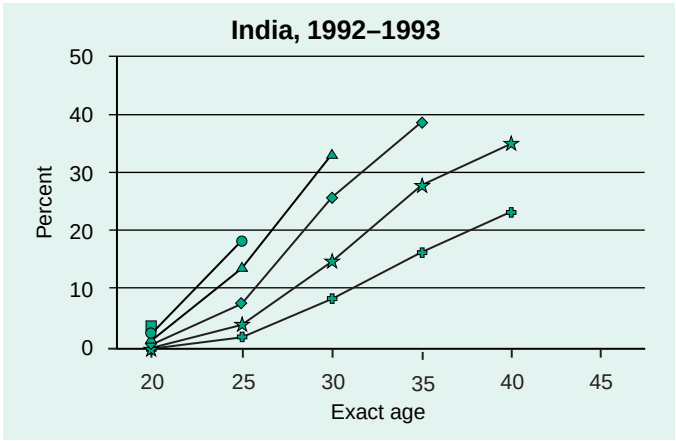


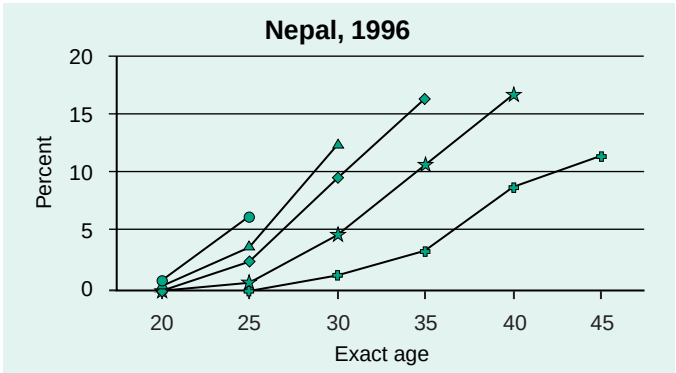


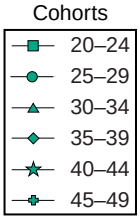
(cont'd.)

Supplement 3.2. Percentage sterilized by exact age, among various cohorts, selected countries *(cont'd.)*









Chapter 4

Law and Policy

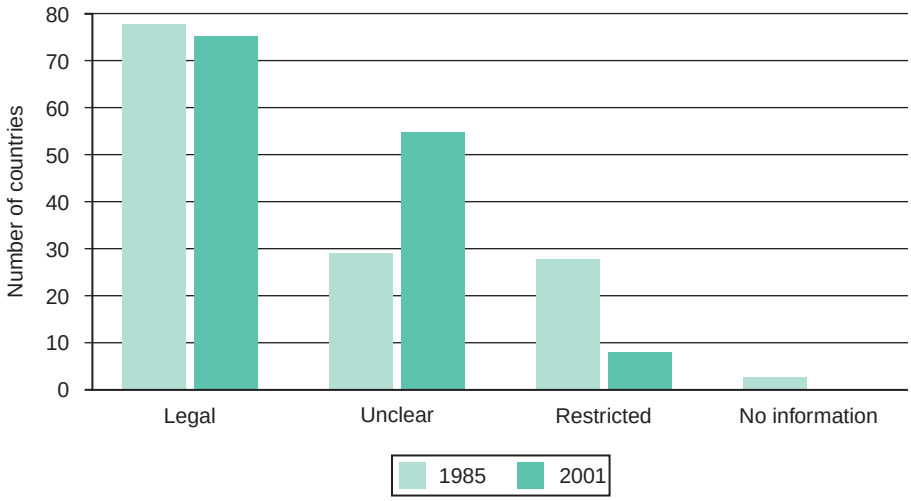
Highlights:

- Seventy-four countries have laws that explicitly permit sterilization for contraceptive purposes. In some, legislation or court decisions specifically authorize voluntary sterilization; in others, voluntary sterilization forms part of the country's family planning or population program and is mentioned in documents describing that program; and in others, the predominant legal opinion is that voluntary sterilization is permissible, although no specific law exists.
- In 55 countries, the legal situation is unclear: Either no law deals specifically with sterilization and there is no authoritative interpretation of how existing law encompasses sterilization, or there are conflicting laws or policies dealing with sterilization.
- Eight countries either explicitly or by interpretation forbid sterilization except for therapeutic reasons (i.e., those beneficial to health) or for medical or eugenic reasons. The number of such countries has decreased, however, from 28 in 1985, and in some of these eight countries sterilization still is provided more broadly than the law may formally permit.
- Twenty-five countries require a spouse, parent, guardian, physician, or committee to consent before at least some sterilization procedures are performed, and 24 countries have an age or parity requirement that must be met prior to sterilization.
- Over the past several decades, the trend in laws affecting sterilization has been one of liberalization, with only a few countries having made minor changes that have been generally conservative in nature.

National laws and policies related to sterilization differ from one country to the next, and they may vary within countries for different groups of people. Some nations have chosen to allow liberal access to sterilization, while others have restricted access or made the procedure illegal. As with other health services, formal policies regulating sterilization have been established through legal statutes, government regulations, and medical guidelines. These policies may prohibit, regulate, or permit a particular health service or require that one or more conditions be met before the service may be obtained. International human rights treaties and other international agreements are also a source of law and policy in the area of reproductive health.

Because laws often follow rather than lead practice, actual medical practice may differ across countries with similar laws. This is especially true when laws concern a field that is undergoing basic technological change or when social conditions or policies shift. In the case of voluntary sterilization, the medical, legal, and social climate can be quite significant. Under restrictive laws, the fear of prosecution may inhibit clinicians from performing sterilization procedures, whereas under liberal laws, individuals may have broad access to sterilization services, compatible with their perceived needs and their choice. On the other hand, restrictive or permissive laws may be ignored, depending on social attitudes and provider policies. In short, the relationship between legality and availability is not always predictable. Therefore, the following summary of sterilization laws attempts to describe them in the context of actual practice.

Figure 4.1. Number of countries where sterilization is legal, where its status is unclear, where availability is restricted, or where there is no information, 1985 and 2001, 137 countries



Current Status of Laws on Sterilization

Determining the status of laws on sterilization is made difficult by one major factor: Medical procedures for sterilization, whether performed for therapeutic or contraceptive purposes, have a very short history. Unlike abortion procedures, for example, sterilization procedures were not performed throughout most of recorded history. In addition, many countries only placed a law on the books when it was decided to either prohibit or regulate sterilization—which leaves uncertain the permissibility of a medical procedure on which the law is silent.

Thus, until recently, very little legislation dealt specifically with sterilization. Although preexisting laws were often applied to sterilization, these were usually laws relating to serious bodily harm (such as laws criminalizing violent acts resulting in the loss of reproductive capacity or, more broadly, laws regarding mutilation or destruction of an organ). These were never intended to apply to medical acts performed at client request and for a client's benefit. Further, some countries' laws sharply regulate the sterilization of particular groups, such as the mentally retarded, but nowhere address sterilization in other circumstances. Hence, today, the legality of sterilization is not addressed or is unclear in many countries.

Due to the lack of specific laws governing sterilization in many places, the legal status of the procedure, though clearer than 15 years ago, is still surrounded with considerable uncertainty. Nonetheless, 137 countries[1] may be classified with regard to the status of their sterilization provisions around the years 1985 or 2001[2] (Figure 4.1) into three broad groups.

In the first, the law **explicitly permits sterilization for contraceptive purposes** (with varying conditions) in 74 countries (Table 4.1). These countries themselves fall

[1] For each year (1985 and 2001), we have information on sterilization's legal status for 137 countries (if Croatia and Slovenia are counted separately from Yugoslavia). In some instances, though, countries covered in 2001 did not exist as states in 1985 (such as the Kyrgyz Republic) or had not had information reported in the earlier study (such as Andorra and Liechtenstein). In other cases, countries that were separate in 1985 had merged by the later date (the two Germanies and the two Yemens). Thus, while the number of countries in the two years is the same, there is not an exact one-to-one correspondence between them.

[2] In other chapters of this book, no information is included past 2000. However, as this book was about to go to press, we received new information on sterilization's legal status in two countries (Chile and France) and have included the 2001 information in this chapter.

Table 4.1. Legal status of sterilization, selected countries, 2001

Allowed for contraceptive purposes (by specific law or regulation, or by interpretation of relevant laws or regulations)			
Andorra (1996)	Fiji	Mongolia (1991)	South Africa (1998)
Australia (1977)	Finland (1970, 1985)	Nepal (1988)	Spain (1983)
Austria (1974)	France (2001)	Netherlands	Sri Lanka
Bangladesh	Germany (1976)	New Zealand (1977)	St. Lucia
Botswana	Ghana (1996)	Nicaragua (1996)	Sweden (1975)
Brazil (1996)	Honduras (1984)	Niger (1988)	Switzerland (1981)
Canada (1979)	Hong Kong	Nigeria (1992)	Tanzania (1994)
Chile (2001)	Hungary (1987)	Norway (1977)	Thailand
China, People's Republic of	Iceland (1975)	Pakistan (1969)	Trinidad and Tobago
China, Republic of [Taiwan] (1984)	India (1986)	Panama (1941)	Tunisia (1973)
Colombia (1984)	Indonesia (2000)	Paraguay (1998)	Turkey (1983)
Costa Rica (1999)	Israel (1994)	Peru (1995, 1997, 1999)	Uganda (1993)
Croatia (1978)	Italy (1978, 1982)	Philippines (1976)	United Kingdom (1972)
Cuba (1968)	Kenya (1986)	Portugal (1984)	United States
Czech Republic (1971, 1991)	Korea, Republic of (1973)	Puerto Rico (1974)	Vietnam (1989)
Denmark (1973, 1976)	Lesotho (1994)	Romania (1989)	Zambia (1965)
Dominican Republic (1972)	Liechtenstein (1987)	Russian Federation (1993)	Zimbabwe (1985)
Ecuador (1992)	Luxembourg (1978)	Singapore (1974)	
El Salvador (1979)	Mexico (1986, 1994)	Slovenia (1977)	
Status is unclear (because information is lacking, obscure, or contradictory)			
Afghanistan	Central African Republic	Iraq (1980)	Monaco
Albania	Chad	Ireland	Morocco
Algeria	Congo, Democratic Republic of	Jamaica	Mozambique
Angola	Côte d'Ivoire	Jordan	Oman
Argentina	Cyprus	Kuwait	Papua New Guinea
Bahrain	Egypt	Lebanon	Poland
Barbados	Ethiopia	Liberia	Senegal
Belgium	Gambia	Madagascar	Sierra Leone
Benin	Grenada	Malawi	Somalia
Bolivia	Greece	Malaysia	Swaziland
Bulgaria	Guinea	Mali	Syria
Burkina Faso	Guyana	Malta	Togo
Burundi	Haiti	Mauritania	Yemen
Cameroon	Iran	Mauritius	
Allowed for therapeutic, eugenic, medical, or health reasons only			
Guatemala	Kyrgyz Republic (1992)	Rwanda (1986)	Sudan (1990)
Japan (1948, 1996)	Myanmar (1963)	Saudi Arabia	Venezuela (1971)

Note: Years of known important changes are given in parentheses.

Sources: Post-1985: Supplement 4.1. Pre-1985: Ross, Hong, & Huber, 1985.

Legal Sources (Principal Bodies of Law)

To ascertain the status of the world's sterilization laws, it is helpful to look at how traditional criminal laws have been applied to sterilization in the principal legal systems. Broadly speaking, there are three systems: common law, civil law, and Islamic law.

- Under **common law**, which derives in large part from law developed in England during the Middle Ages and which spread throughout the world through British colonial rule, voluntary sterilization is generally considered legal. Aside from the United Kingdom, common-law countries are found in Anglophone Africa, the Caribbean, South Asia, North America, and Oceania.
- Under **civil law**, which derives from Roman law and strongly influences the laws of the countries of continental Europe, sterilization has historically been considered an offense involving serious bodily injury unless it is specifically authorized by statute. Civil-law countries include most of those in continental Europe, as well as countries in Africa and Latin America formerly under continental European colonial rule. A number of these countries now have statutes specifically authorizing sterilization.
- Under **Islamic law**, the majority opinion is that permanent forms of sterilization are contrary to the purposes of marriage and procreation and thus are not allowed except for health or, in some cases, eugenic reasons. A minority views sterilization for family planning purposes as allowed under certain circumstances, such as to combat high rates of population growth. Islamic law influences the laws of countries of Northern Africa and the Middle East, as well as Asian countries with large Muslim populations. It is important to note, however, that under Islam, law is not fundamentally separated from religion, as it is in many Western countries. While the prevailing view of the five major schools of Islamic law (four Sunni and one Shiite) are central in determining legal issues, the opinions of *mullahs* (religious leaders) also play a role in interpretation. (For a discussion of sterilization under Islamic law, see Stepan, Kellog, & Piotrow, 1981.)

roughly into three broad categories: countries in which legislation or court decisions specifically authorize voluntary sterilization; those in which voluntary sterilization forms part of the country's family planning or population program and is mentioned in documents describing that program; and those in which the predominant legal opinion is that voluntary sterilization is permissible, although no specific laws exist.

The line between the first two categories is not always entirely clear, since, for example, a population program may also be codified as law. Included in the group of countries explicitly permitting sterilization are a few African countries, most large Asian countries, most European countries, and half of those in Latin America and the Caribbean, as well as Australia, Canada, New Zealand, and the United States.

In 55 countries, **the legal situation is unclear.** These have no laws dealing specifically with sterilization and no authoritative interpretation of how existing law encompasses sterilization, or have conflicting laws or policies dealing with sterilization. Included in this category are most African and Middle Eastern countries. Despite the absence of definitive laws dealing with sterilization in these countries, the generalizations made in the sidebar (at left) with respect to the position of the three major legal systems on sterilization can cautiously support reasonable assumptions about the likely legal status of sterilization in countries in this category.

Finally, in eight countries, **the law either explicitly or by interpretation forbids sterilization except for therapeutic reasons (i.e., those beneficial to health) or for medical or eugenic reasons.** In 1985, in contrast, 28 countries fell into this category.

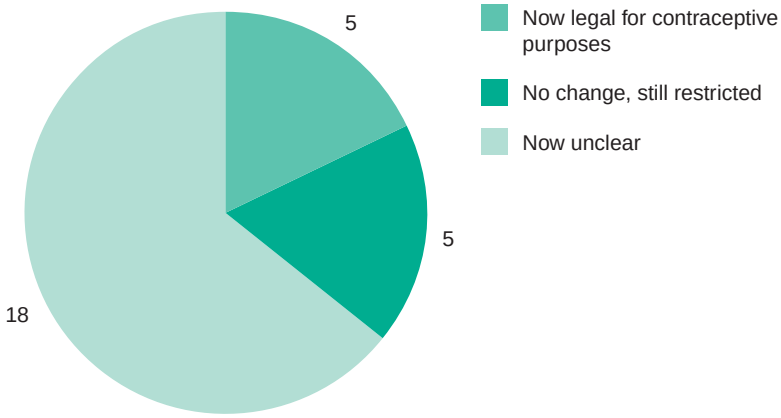
Between 1985 and 2001, the status of the law changed in 23 of these 28 countries: The majority in which changes occurred (Algeria, Bahrain, Belgium, Chad, Egypt, Greece, Iran, Jordan, Kuwait, Madagascar, Mali, Malta, Mauritania, Oman, Somalia, Syria, Togo, and Yemen) went from restricting sterilization either explicitly or by interpretation in 1985 to being unclear about its legal status in 2001 (Figure 4.2). The remaining five (Brazil, Chile, Mongolia, Nicaragua, and Peru) legalized sterilization for contraceptive purposes.

Five nations with laws in 1985 restricting sterilization (Japan, Myanmar, Rwanda, Saudi Arabia, and Venezuela) made no change in their sterilization-related laws. In addition, over the 16-year period, three countries that formerly had unclear legal status or no specific sterilization laws (Guatemala, the Kyrgyz Republic, and Sudan) had by 2001 begun to restrict sterilization (not shown).

This categorization of countries should be interpreted with care. Even where voluntary sterilization is officially allowed only for medical or eugenic reasons, it can often be performed for other reasons under this legal umbrella. For example, in Japan (where sterilization is restricted), contraceptive sterilizations are performed routinely, with health reasons given as the justification. Moreover, the distinction between therapeutic reasons and other reasons for sterilization is not always clear. In developing countries, for example, it may be difficult for both the provider and the client to distinguish health reasons from socioeconomic reasons, especially if the client is nutritionally deprived.

Figures 4.1 and 4.3 (page 92) graphically depict the status of laws, showing both worldwide and regional perspectives. Regionally, the proportion of countries where sterilization is legal for contraception varies dramatically. In Sub-Saharan Africa, two-thirds of the countries included here (24 of 37) have laws regarding sterilization that are unclear, and fewer than one-third (11 of the 37) permit sterilization for contraceptive purposes. In Asia, the status of sterilization is unclear in only one country (Malaysia), and sterilization is legal for contraception in more than three-quarters. In the Latin American and Caribbean countries covered, more than half legally permit sterilization for contraceptive purposes, as do most European nations. However, as we noted above, legality may differ significantly from actual practice; thus, in some places where sterilization is restricted to medical or eugenic reasons, a person who desires sterilization for contraceptive purposes may still be able to have one.

Figure 4.2. Among 28 countries that in 1985 had policies limiting sterilization to medical or health reasons, number where legal status changed from 1985 to 2001



Conditions and Limitations

Many governments that allow sterilization for contraceptive purposes or for medical or eugenic reasons have set certain conditions and limitations to obtaining sterilization services (Supplement 4.1, page 100). Twenty-five countries, for example, require the consent of a spouse, parent, guardian, physician, or committee before some sterilization procedures are performed. Twenty-four countries have an age or parity requirement that individuals must meet prior to sterilization.

Consent of spouse, parent, guardian, or others

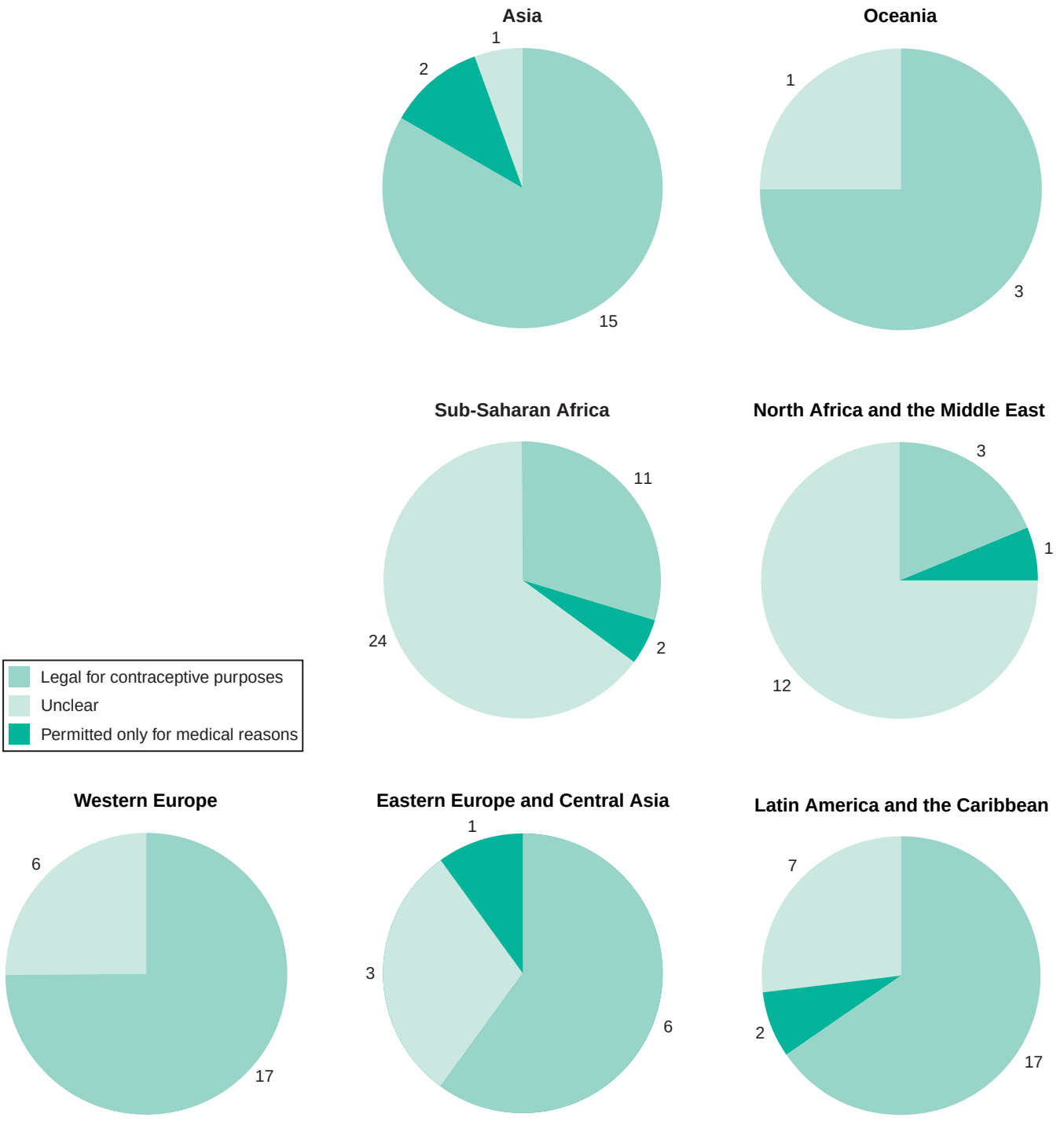
Many countries require spousal consent for voluntary sterilization, countries as widely varied as Brazil, Chile, Ecuador, Guatemala, Honduras, Japan, Niger, the Republic of China (Taiwan), Rwanda, and Turkey. In addition, Finland, Hungary, and Switzerland usually require the spouse to be informed. Most spousal-consent laws are not gender-specific; however, in practice, these laws are more likely to be enforced so as to require that women obtain consent from their husbands than vice versa.

In most countries, as is the case with many other serious medical procedures, minors and the incompetent cannot be sterilized without consent from a parent or guardian, since, to varying degrees, they are not considered able to consent on their own (not indicated in Supplement 4.1). Extraordinary in this respect are requirements in Honduras that the parents or spouse consent to all contraceptive sterilizations and in Norway that the guardian consent to the sterilization of a person younger than 20 (Supplement 4.1). In addition, in a number of developed countries (among them, Australia, Canada, Germany, the United Kingdom, and the United States), questions have been raised as to whether a parent or guardian should be allowed to consent to the sterilization of an incompetent person without court or committee approval. The major concern is that a request for sterilization may be made to satisfy the needs or convenience of the person requesting the sterilization, and may not necessarily be in the best interests of the incompetent person.[3] Courts have reached differing conclusions in such cases. In Croatia, Germany, Slovenia, and South Africa, legislation has been enacted requiring court approval.

In a number of other countries, physicians or committees must certify that certain conditions exist before a sterilization will be allowed. In Croatia, the Czech Republic, Denmark, Finland, Iceland, Norway, Panama, Slovenia, and Sweden, a committee must

[3] Such cases revolve around a concern that parents of an incompetent person may act based on self-interest (e.g., financial, legal liability, etc.) instead of on behalf of the individual.

Figure 4.3. Number of countries where sterilization is legal for contraceptive purposes, where it is permitted only for medical reasons, or where its status is unclear, by region, 2001, 133 countries



approve sterilizations performed for health, eugenic, or socioeconomic reasons. In Brazil and Guatemala, two physicians must approve such sterilizations, and in Honduras, three must do so.

Minimum age and parity requirements

In the past 15 years, the overall number of countries in which age and parity requirements are placed on legal contraceptive sterilization has changed very little (Figure 4.4). The most notable change is that five countries that did not explicitly allow sterilization in 1985 (Brazil, Hungary, Mongolia, Niger, and the Russian Federation) had by 2001 begun to allow it for contraceptive purposes once age or parity requirements were fulfilled. Of the 23 countries that allowed contraceptive sterilization with a minimum age or parity requirement in 2001, some had gender-specific requirements, while others had more general policies that pertained to all individuals (Supplement 4.1).

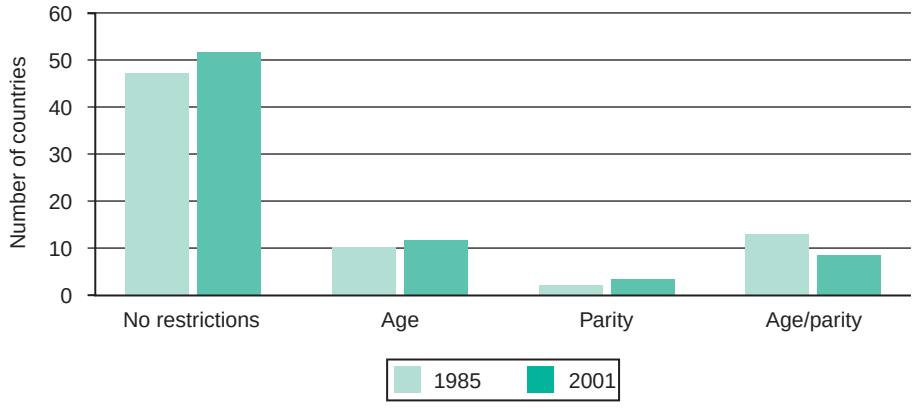
A number of countries have specific age requirements for sterilization. The most common minimum age is 25, and can be found in Austria, Croatia, Denmark, Iceland, Liechtenstein, Norway, Portugal, and Sweden. In Slovenia, the minimum age is 35 (Supplement 4.1). Where sterilization is specifically allowed by statute but no age is mentioned, the age is usually assumed to be that of majority, although in some countries persons younger than the age of majority are considered competent to consent to medical treatment, presumably including sterilization.

Three countries impose parity requirements only, which are based on a person's number of children. In Tunisia, an individual must have four children before obtaining a sterilization for contraceptive purposes. In Panama, a *woman* must have five children, and in Mongolia, she must have "many" children (in these cases, there are no expressed restrictions for men).

Several other countries, however, combine parity and age requirements. One combination of these requirements includes a minimum age for sterilization and a parity requirement for those who are younger than the minimum age. For example, Brazil allows sterilization at age 25 or requires people younger than 25 to have two children before they can be sterilized; Finland has a minimum age of 30 or a requirement that a person have had three children if younger than 30; India requires women to be 20 and men to be 25, or to have had two children if they are younger; and the Russian Federation allows sterilization at age 35, or requires those younger than 35 to have had at least two children. Hungary has more specific requirements, allowing sterilization at age 40, at age 35 if the individual has had three children, or at age 30 if the person has had four.

Many countries do not have a minimum age at sterilization alone, but require both age and parity minimums together. For example, Cuba requires a person to be 32 and

Figure 4.4. Among countries where contraceptive sterilization was legal, number with various restrictions, 1985 (n=78) and 2001 (n=74)



to have "several" children; the Czech Republic, age 35 and three children or younger than 35 and four children; the Dominican Republic, 40 and one child, 35 and three children, 30 and five children, or 25 and six children (women only); Ecuador, age 25 and three children; and Honduras, age 35 and one child or age 24 and three children for women, and age 30 and three children for men. Niger has both an age minimum of 35 and a parity requirement of four children for women but only a parity requirement of six children for men.

Gender of person sterilized

In a number of countries, a gender-based disparity is reflected in the law for those who seek sterilization. As in some examples above, age and parity requirements for sterilization may differ for men and women. For example, legislation regulating sterilization in the Dominican Republic and Panama applies to women only; the laws have no provisions that deal with men. As a result, it is unclear whether men are free to be sterilized without meeting any requirements or if they are prohibited from being sterilized.

Informed consent and coercion

An issue of major concern in the context of voluntary sterilization is that of informed consent—i.e., whether the sterilization is truly voluntary. Although informed consent is ethically mandated for all surgical procedures and often is legally mandated as well, it is not uncommon to find a specific legal provision on informed consent for sterilization even where the law is otherwise silent. On the other hand, a number of countries include informed consent provisions within their sterilization laws. Brazil, Chile, Colombia, France, Hungary, India, Mexico, Peru, Portugal, South Africa, Uganda, and the United States specifically require persons seeking sterilization to give their informed consent. While not mandating that information be provided, laws in the Dominican Republic and Guatemala require that consent be given. Lesotho's population policy requires counseling.

As a legal matter, informed consent generally requires that the person seeking a medical procedure be provided information on the risks, benefits, alternatives, and characteristics of the procedure and that he or she be subject to no form of coercion when deciding to undergo the procedure. In the case of sterilization, required information would include that temporary methods are available, that the procedure involves surgery, that the surgical procedure involves risks and benefits, that if the procedure is successful the client will not be able to have any more children, that the effect of the procedure is permanent (with a small risk of failure), that the client can change his or her mind and decide against the procedure at any time, and that the procedure does not provide any protection against sexually transmitted infections or HIV. Counseling may also be required, and the person may be required to sign a consent form.

Coercion can take many forms. The most blatant and direct is physically forcing a person to be sterilized. But more subtle—and more prevalent—forms of coercion include psychological pressure applied by medical personnel, government officials, employers, or family members, and incentives or disincentives to sterilization. The latter range from providing monetary awards to offering additional social benefits or tax relief to imposing fines or denying various social benefits. Whether a specific incentive or disincentive is considered coercive depends on the nature of the incentive or disincentive. (For more discussion about informed choice and consent, see Chapter 1.)

Sterilization Laws in the Developed World

Most developed countries allow voluntary sterilization for contraceptive purposes. In the United States, competent adults (those who are capable of making an informed decision) can undergo sterilization legally in all 50 states and all territories. Federally

funded voluntary sterilization is subject to restrictions on age (a minimum of 21 years) and a waiting period (30 days), but none related to marital status, parity, or spousal consent. While states are allowed to create their own guidelines for state-funded sterilization, some simply follow federal guidelines. No legal restrictions associated with age, parity, marital status, or waiting period apply to privately funded services.[4]

In Canada, voluntary sterilization is available legally for contraceptive purposes without requirements as to age, marital status, parity, or socioeconomic status. Although Japan's Maternal Protection Law specifically allows voluntary sterilization only for health reasons, actual practice differs. The term "health reasons" is interpreted broadly so as to encompass sterilizations performed for contraceptive purposes as well (Muramatsu & Katagiri, 1981).

In Australia, although some doctors are reluctant to perform sterilizations because of the lack of specific statutory authorization, the absence of either statutory or common-law prohibitions allows voluntary contraceptive sterilization to be practiced. Moreover, in 1977, the Royal Commission on Human Relationships recommended that doubts concerning the legality of the operation be removed. Today, substantial numbers of sterilizations are performed. New Zealand permits contraceptive sterilization by statute.

In the United Kingdom, sterilization for contraceptive reasons is a lawful medical service. Vasectomy became explicitly legal in 1972, while female sterilization is considered legal without the need for a specific statute. Elsewhere in Western Europe (Austria, Denmark, Finland, France, Germany, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland), laws on sterilization have undergone important changes in recent decades and are now favorable toward voluntary sterilization. Statutes and court decisions in individual countries have produced these changes, and an influential international step was taken in 1975, when the Committee of Ministers of the Council of Europe voted that voluntary sterilization should be made available for family planning purposes.

In the majority of the Eastern European countries (Albania, Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Russian Federation, and Slovenia), voluntary sterilization either is specifically permitted by law or is not specifically prohibited (and is, therefore, implicitly allowed).

Sterilization Laws in the Developing World

Over the past 40 years in the developing world, the nature of legislation on voluntary sterilization has undergone a transformation. Increasingly, governments have modified their laws, regulations, and policies to recognize sterilization as an approved method of fertility limitation, as distinct from a purely medical necessity acceptable only in isolated cases. Nonetheless, while change has occurred in many developing countries, the legal status of voluntary sterilization is still unclear in many others, even where the method has become medically and socially acceptable.

The trend toward liberalization is particularly apparent in the developing countries with the largest populations. In the eight countries that contain about two-thirds of the developing world's population (Bangladesh, Brazil, China, India, Indonesia, Mexico, Nigeria, and Pakistan), the situation is as follows:

- China and India, which contain half of the developing world's population, not only make voluntary sterilization available, but also actively encourage it through government policies and programs.
- The policy of Indonesia, the third-largest developing country, has been cautious for religious reasons. While voluntary sterilization for men and women has never been actively promoted, the government allocates funds

[4] One exception is in New York City, where a 30-day waiting period and a moratorium on sterilization for people younger than 21 is required for both publicly and privately funded services.

to support voluntary sterilization through the coordination of a nongovernmental organization. The performance of female and male sterilization is permitted within hospitals and community health centers.

- In both Bangladesh and Pakistan, provisions of the penal codes dealing with intentional bodily injuries are usually not considered applicable to voluntary surgical contraception, and sterilization is generally regarded as lawful. Both governments promote the voluntary sterilization of consenting adults as part of their national family planning programs.
- In Brazil, the government enacted landmark legislation in 1996 permitting voluntary sterilization for family planning purposes when a person is aged 25 or is younger than 25 and has two children, as well as sterilization for health and eugenic reasons. Spousal consent is required. Even before this legislation was enacted, clinicians performed large numbers of sterilizations, many of them in combination with cesarean deliveries, which were reimbursed for women covered under the extensive social security system.
- Although no Nigerian law regulates sterilization, the government has officially reported that sterilization is allowed for eugenic, health, and family planning reasons.
- In Mexico, voluntary sterilization is legal, and the country officially includes it in its family planning program and regulations.

In addition to these countries, Peru is noted for its liberalization of legislation. Until 1995, sterilization was prohibited for contraceptive purposes. Since a 1999 government provision, clients must have two counseling sessions, sign an informed consent document, and wait 72 hours prior to sterilization. Voluntary sterilization services are provided by the state free of charge, through various health facilities.

Recent Changes in Sterilization Laws

In the past few decades, the trend in sterilization has been toward liberalization, often occurring at a time when voluntary sterilization is incorporated into the national family planning program. Since 1985, only minor changes that are conservative in nature have been made, and in at least one case (in Guatemala) the change in law was contradicted by the government's own practice in its family planning program (Supplement 4.1).

Between 1984 and 2001, 27 countries passed legislation or introduced policies that allowed contraceptive sterilization on request with no conditions, that approved sterilization for family planning purposes subject to certain conditions (usually related to age or number of children), that allowed contraceptive sterilization without specifying whether conditions exist, or that restricted access to sterilization (Table 4.2).

Iran adopted a new penal code based on Islamic law that eliminated provisions from the old penal code authorizing sterilization. The practical effect of this change is unclear, however, since Iran relies extensively on sterilization as part of its family planning program.

The state of Cordoba in Argentina, where the status of sterilization for other than health reasons is unclear, removed from its Law on Professions provisions that prohibited the performance of sterilization.

In addition to making changes in sterilization legislation and policy, some countries have issued amendments or provisions reinforcing their former policies. For example, Vietnam provided that incentives were to be offered for tubal ligations and vasectomies for family planning purposes, while Japan amended its Eugenic Protection Law to remove eugenic grounds for sterilization and changed the law's name to the Maternal Protection Law.

International Law and Policy Consensus

The laws and policies reviewed above are the sources of authority that most directly permit, restrict, or prohibit sterilization services in each country. Nevertheless, in the

Table 4.2. Countries with changes in sterilization laws, by type of change, 1984–2001

Allows sterilization	Allows sterilization with conditions or limitations	Allows sterilization, yet does not specify whether conditions exist	Restricts sterilization
Andorra	Brazil	Ghana	Guatemala
Chile	Republic of China (Taiwan)	Lesotho	Kyrgyz Republic
Colombia	Ecuador	Mexico	Sudan
Costa Rica	Hungary	Nepal	
France	Mongolia	Nicaragua	
Liechtenstein	Niger	Paraguay	
Romania	Peru	Zimbabwe	
Tanzania	Portugal		
	Russian Federation		

last decade or more, a body of international law and policy has emerged that, at least in theory, affects the legality of contraception and sterilization at the national level. Nations that have formally signed certain international documents can be deemed bound by their provisions—subject to the limitations laid out in Obstacles to the Enforcement of International Human Rights Law (right). These documents include international human rights treaties and conventions, and the programs of action resulting from United Nations–sponsored international conferences that are signed by the delegates of nation-states and adopted by the General Assembly.

These sources state international law and policy in a form that differs in many significant respects from national law. In particular, these sources often set forth rights or affirmative policy objectives that, depending on the authority and enforceability granted by the national law of a particular country, may establish a legal norm for what the government must provide or allow. In contrast, many national laws are prohibitory in nature.

Sources of international law and policy

The body of international human rights law has expanded significantly over the past several decades. First, countries have adopted international treaties such as the International Covenant on Civil and Political Rights (UN, 1967a), the International Covenant on Economic, Social, and Cultural Rights (UN, 1967b), and, more recently, the Convention on the Elimination of All Forms of Discrimination against Women (Women's Convention) (UN, 1980) and the Convention on the Rights of the Child (UN, 1989). On a regional basis, countries have also ratified the European Convention on Human Rights (Council of Europe, 1950), the American Convention on Human Rights (OAS, 1970), and the African Charter on Human and Peoples' Rights (OAU, 1982). These treaties are legally binding on countries that have ratified them.

Second, countries have participated in a series of human rights–related conferences convened by the United Nations and have endorsed conference documents adopted by the conferences. Such conferences extend back to the International Conference on Human Rights (held in Teheran in 1968) and in the mid-1990s culminated in a series of six conferences, including the World Conference on Human Rights (held in Vienna in 1993), the International Conference on Population and Development (held in Cairo in 1994), and the Fourth World Conference on Women (held in Beijing in 1995). Although not legally binding, the documents adopted at these conferences constitute globally accepted policy norms, and countries that have endorsed them have undertaken a commitment, however general, to abide by their principles.

Obstacles to the Enforcement of International Human Rights Law

Although international human rights law may establish clear rules on specific topics, including reproductive choice, a number of obstacles obstruct their enforcement:

- Countries that have ratified treaties often express reservations to certain controversial provisions of those treaties, indicating that they do not consider themselves bound by the provisions.
- Certain treaties, including the Women's Convention, have no enforcement mechanisms. (The Women's Convention has a monitoring committee for periodic reviews, which include country reports submitted by governments on the progress they have made.)
- Before the provisions of treaties are enforceable, countries must often adopt them into national laws. A number of countries sign treaties but never enact such laws.
- Although the provisions of conference documents such as those approved at Cairo and Beijing are endorsed by various governments, they have no official legal force.

Sterilization under International Law

The status of voluntary sterilization under international law is not explicit. The procedure of sterilization is specifically referred to in relevant treaty and document provisions only once, and this is in the context of coercive family planning practices. On the basis of this reference and other language condemning the use of violence and supporting informed consent, it is fair to conclude that under international legal standards, there are rights against forced sterilization and, when someone is undergoing sterilization, he or she has the right to be provided with full informed consent about the procedure. In addition, laws that set different conditions for sterilization based on gender clearly are unacceptable under treaty provisions that guarantee the equality of men and women.

Whether international law unequivocally supports a right to choose sterilization is more problematic. On the one hand, considered together, the Women's Convention and conference documents guarantee a broad right to decide freely on reproductive matters and to have access to the full range of safe and effective family planning methods of choice. On the other hand, this right, although broad, is qualified, in that access is to be given only to "acceptable" methods.

The right to reproductive choice and family planning

One aspect of this expansion of the body of international human rights law has been to establish a right to reproductive choice. Such a right finds indirect support in a number of treaty provisions guaranteeing specific rights (Cook, 1995; Packer, 1996). Among these are the right to marry and form a family, the right to the highest attainable standard of health, the right to receive and impart information, the right to the benefits of scientific progress, the right to the enjoyment of private and family life, and the right to liberty and security of the person. Although these rights are somewhat abstract in nature and do not deal specifically with reproduction, they have been applied to reproductive self-determination and decision making.

International human rights law also contains direct support for a right to reproductive choice (Freedman & Isaacs, 1993). (More detail concerning international law and sterilization is given at left.) Such support dates as far back as 1968, when the International Conference on Human Rights adopted a declaration endorsing a right "to determine freely and responsibly the number and spacing of . . . children" (UN, 1968). This right has subsequently constituted the core of the right to reproductive choice under international law and has been reiterated in numerous conference declarations. In 1979, it was incorporated into a formal treaty, the Women's Convention. Countries that ratified the convention undertook to ensure, on the basis of equality of men and women, the "same rights to decide freely and responsibly on the number and spacing of their children and to have access to the information, education, and means to enable them to exercise these rights" (UN, 1980). The Convention also commits such countries to ensure access to information and advice on family planning and access to health care and services, including those related to family planning.

This right to reproductive choice has been elaborated in programs of action adopted at the international conferences on population and women, convened in Cairo in 1994 and Beijing in 1995, respectively (UN, 1994; UN, 1996). In addition to reaffirming the language in the Women's Convention, the declarations further define the nature of family planning and related services to which individuals have a right. These include access to safe, effective, affordable, and acceptable family planning methods of their choice. The declarations repeatedly emphasize the importance of making available a full and comprehensive range of contraceptive methods.

These programs of action also address coercion and informed consent. Both provide that the right to reproduction includes the right to make decisions concerning reproduction free of discrimination, coercion, and violence, as expressed in human rights documents. Consent is to be informed and voluntary, and family planning programs in particular are to be based on informed free choice; reliance on quotas, incentives, and targets is discouraged. The Beijing document specifically refers to forced sterilization in the context of condemning the use of coercion and violence.

Thus, the developing norms of international human rights law have established a right to reproductive choice. Anchored in the Women's Convention, supported by relevant provisions of other international and regional treaties, and elaborated upon in a series of recent international conference documents, this right consists of the right of individuals to universal access to a full and comprehensive range of family planning methods, to decide freely and responsibly on the number and spacing of their children. This right is to be exercised with informed consent, free of coercion, and without discrimination on the basis of sex.

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Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country

Country	Current status	Consent needed (other than from client)	Source
Asia			
Bangladesh	Legal for contraceptive reasons		Population policy (feature of policy)
China, People's Republic of	Legal for contraceptive reasons (local laws provide incentives and disincentives)	No consent requirements	Family planning program (feature of program)
China, Republic of (Taiwan)	Legal for contraceptive reasons; act also authorizes for eugenic and health reasons	Spouse (for contraceptive reasons only)	Eugenics Protection Act (1984)
Hong Kong	Legal for contraceptive reasons		By interpretation of existing law or regulation
India	Legal for contraceptive reasons when man is aged 25 or when woman is aged 20–45; lower age limits may be relaxed if couple has two children	No consent requirements	Guidelines for voluntary sterilization (1986)
Indonesia	Legal for contraceptive reasons; acceptors must be married		Ministry of Health, Decree No. 8/ Menkes (2000)
Japan	Legal for health reasons only (yet widely performed)	Spouse	Eugenic Protection Law, as amended (1948, 1996)
Korea, Republic of	Legal for contraceptive reasons		Family planning program (feature of program)
Malaysia	Legal for health reasons only	Two physicians	
Mongolia	Legal for contraceptive reasons when woman has many children; policy also authorizes for eugenic reasons	No consent requirements	Population policy (1991)
Myanmar	Legal for health reasons only	Board	Penal Code (1963)
Nepal	Legal for contraceptive reasons		Population policy (1988) (feature of policy)
Pakistan	Legal for contraceptive reasons		Family planning program (1969) (feature of program)
Philippines	Legal for contraceptive reasons	No consent requirements	Presidential Decree amending the Philippine Medical Care Act of 1969 (1976)
Singapore	Legal for contraceptive reasons	No consent requirements	Voluntary Sterilization Act (1974)
Sri Lanka	Legal for contraceptive reasons		Family planning policy (feature of policy)
Thailand	Legal for contraceptive reasons		Family planning policy (feature of policy)
Vietnam	Legal for contraceptive reasons	No consent requirements	Public Health Law (1989)
Oceania			
Australia	Legal for contraceptive reasons	No consent requirements	Interpretation of existing law or regulation (depending on state)
Fiji	Legal for contraceptive reasons		Family planning program (feature of program)
New Zealand	Legal for contraceptive reasons	No consent requirements	Contraception, Sterilization, and Abortion Act (1977)

(cont'd.)

Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country *(cont'd.)*

Country	Current status	Consent needed (other than from client)	Source
Oceania *(cont'd.)*			
Papua New Guinea	Unclear		
Latin America and the Caribbean			
Argentina	Unclear (in practice, reported only for health reasons)		
Barbados	Unclear		
Bolivia	Unclear (but practiced)		
Brazil	Legal for contraceptive reasons when aged 25, or when <25 with two children; law also authorizes sterilization for health and eugenic reasons	Spouse; in case of sterilization for noncontraceptive reasons, two physicians must consent	Law on family planning (1996)
Chile	Legal for contraceptive reasons	No consent requirements	Resolution of Ministry of Health (2001)
Colombia	Legal for contraceptive reasons	No consent requirements	Resolution on fertility regulations (1984)
Costa Rica	Legal for contraceptive reasons	No consent requirements	Decree creating an interinstitutional commission on health and reproductive and sexual rights (1999)
Cuba	Legal for contraceptive reasons when aged 32 with several children	No consent requirements	Ministry of Public Health Regulations (1968)
Dominican Republic	Legal for contraceptive reasons when woman is aged 40 with one child, or aged 35 with three children, or aged 30 with five children, or aged 25 with six children (pertains to women only). Regulations also authorize sterilization for health or eugenic reasons		Regulations of Ministry of Health (1970s)
Ecuador	Legal for contraceptive reasons when person is aged 25 with three children; code also authorizes sterilization for eugenic and health reasons	Spouse	Code of Medical Ethics (1992)
El Salvador	Legal for contraceptive reasons for any person of fertile age; instructions also authorize sterilization for health reasons	No consent requirements	Instructions of Ministry of Health and Social Assistance on Contraception (1979)
Grenada	Unclear		
Guatemala	Legal for health reasons only (yet commonly performed for contraceptive purposes)	Spouse; two physicians	Ethics Code (1991)
Guyana	Unclear		
Haiti	Unclear		
Honduras	Legal for contraceptive reasons when woman is aged 35 with one child, or 24–34 with three children, or when man is aged 30 with three children; resolution also authorizes sterilization for therapeutic reasons	Parents or spouse; in sterilization for therapeutic reasons, three physicians must consent	Resolution of the Ministry of Health on Sterilization (1984)

(cont'd.)

Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country *(cont'd.)*

Country	Current status	Consent needed (other than from client)	Source
Latin America and the Caribbean *(cont'd.)*			
Jamaica	Unclear (yet widely performed)		
Mexico	Legal for contraceptive reasons	No consent requirements	General Health Law (1983); Health Regulations (1986); Family Planning Regulations (1994)
Nicaragua	Legal for contraceptive reasons		Population policy (1996) (feature of policy)
Panama	Legal for contraceptive reasons for women with at least five children and in difficult socioeconomic conditions	Sterilization board	Law permitting sterilization (1941)
Paraguay	Legal for contraceptive reasons		Family planning manual (1998)
Peru	Legal for contraceptive reasons; person must undergo two counseling sessions, sign an informed consent document, and wait 72 hours prior to sterilization	No consent requirements	Law on population policy (1995); law on health (1997); Ministry of Health Resolution (1999)
Puerto Rico	Legal for contraceptive reasons	No consent requirements	By interpretation of existing law or regulation
Saint Lucia	Legal for contraceptive reasons		By interpretation of existing law or regulation
Trinidad and Tobago	Legal for contraceptive reasons		
Venezuela	Legal for eugenic and health reasons only		Code of Medical Ethics (1971) (may not have legal force)
North America			
Canada	Legal for contraceptive reasons	No consent requirements	By interpretation of existing law or regulation
United States	Legal for contraceptive reasons	No consent requirements	State laws
Western Europe			
Andorra	Legal for contraceptive reasons	No consent requirements	Law amending the Penal Code (1996)
Austria	Legal for contraceptive reasons when aged 25, or when <25 for health reasons	No consent requirements	Act amending the Penal Code (1974)
Belgium	Unclear (but practiced)		
Cyprus	Unclear		
Denmark	Legal for contraceptive reasons when aged 25; law also authorizes sterilization for woman <25 if pregnancy would pose threat to life or threaten serious and permanent injury to health; for social and eugenic reasons; and only for very special reasons among persons <18. (Law does not apply to sterilization to cure physical disease.)	In sterilization for social or eugenic reasons, a committee must consent	Law on sterilization and castration (1973); Ministry of Justice Order and Circular (1976)

(cont'd.)

Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country *(cont'd.)*

Country	Current status	Consent needed (other than from client)	Source
Western Europe *(cont'd.)*			
Finland	Legal for contraceptive reasons when person is aged 30, or has three children, or lacks other methods to prevent pregnancy; law also authorizes sterilization for health, eugenic, or social reasons; law permits sterilization for persons <18 only for cogent reasons	In sterilization for contraceptive reasons when person is aged 30 or has three children, one physician must consent; in sterilization for those lacking other method, two physicians must consent; in sterilization for health reasons, two physicians must consent; in sterilization for eugenic or social reasons, National Board of Health is required to consent. Spouse is to be informed in all cases	Law on sterilization, as amended (1970, 1985)
France	Legal for contraceptive reasons after a waiting period of four months	No consent requirements	Law No. 2001-588 (2001)
Germany	Legal for contraceptive reasons	No consent requirements	Court decision (1976)
Greece	Unclear		
Iceland	Legal for contraceptive reasons when aged 25; law also authorizes sterilization for health, socioeconomic, or genetic reasons	Two physicians must consent in sterilization for health or genetic reasons; one physician and one social worker must consent in sterilization for socioeconomic reasons	Law on sex education, sterilization, and abortion (1975)
Ireland	Unclear		
Italy	Legal for contraceptive reasons	No consent requirements	Law on social protection of motherhood and on voluntary abortion (1978); Supreme Court decision (1982)
Liechtenstein	Legal for contraceptive reasons when person is aged 25; code also authorizes sterilization for noncontraceptive reasons	No consent requirements	Penal Code (1987)
Luxembourg	Legal for contraceptive reasons	No consent requirements	Law on regional centers for sex education and abortion (1978)
Malta	Unclear		
Monaco	Unclear		
Netherlands	Legal for contraceptive reasons	No consent requirements	By interpretation of existing law or regulation
Norway	Legal for contraceptive reasons when person is aged 25; law also authorizes sterilization when person is aged 18–25 and has health (women only), socioeconomic, or eugenic reasons, or when person is <18 and has imperative reasons	Approval of sterilization board is required when person is <25 and is sterilized for health, socioeconomic, or eugenic reasons; guardian must also consent if person is <20	Law on sterilization (1977)

(cont'd.)

Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country *(cont'd.)*

Country	Current status	Consent needed (other than from client)	Source
Western Europe *(cont'd.)*			
Portugal	Legal for contraceptive reasons when person is aged 25; law also authorizes sterilization for therapeutic reasons when person is <25	No consent requirements	Law on sex education and family planning (1984)
Spain	Legal for contraceptive reasons	No consent requirements	Law legalizing sterilization (1983)
Sweden	Legal for contraceptive reasons when person is aged 25; law also authorizes sterilization for eugenic, health (women only), or sex-change reasons, when person is aged 18–25	National Board of Health and Welfare must consent in sterilizations for non-contraceptive reasons	Law on sterilization (1975); circular on sterilization (1975)
Switzerland	Legal for contraceptive reasons	Spouse must be consulted	Guidelines of Swiss Academy of Medical Sciences (1981) (not technically binding)
United Kingdom	Legal for contraceptive reasons	No consent requirements	National Health Service Family Planning Amendment Act (1972) (covers men only; there is no law for women)
Eastern Europe and Central Asia			
Albania	Unclear		
Bulgaria	Unclear		
Croatia	Legal for contraceptive reasons when aged 35; law also authorizes sterilization for health and eugenic reasons	In sterilization for noncontraceptive reasons, a commission must consent	Law on implementing the right to decide on the birth of children (1978)
Czech Republic	Legal for contraceptive reasons when aged 35 with three children, or <35 with four children; law also authorizes sterilization for health and genetic reasons	Technical Commission	Law amending the Law on the Protection of Public Health (1991); Ministry of Health Instruction (1971)
Hungary	Legal for contraceptive reasons when person is aged 40, or aged 35 with three children, or aged 30 with four children; decree also authorizes sterilization for genetic or health reasons	Approval of Genetic Counseling Service is required in sterilization for genetic reasons; approval of hospital or clinic department is required in sterilization for health reasons; spouse is to be informed of sterilizations for contraceptive or health reasons	Decree of Ministry of Health on Sterilization (1987)
Kyrgyz Republic	Legal for medical reasons (women only)	No consent requirements	Law on health (1992)
Poland	Unclear		
Romania	Legal for contraceptive reasons	No consent requirements	Order repealing abortion restrictions (1989)
Russian Federation	Legal for contraceptive reasons when person is aged >35 or has two children; law also authorizes sterilization for health reasons		Law on public health care (1993)

(cont'd.)

Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country *(cont'd.)*

Country	Current status	Consent needed (other than from client)	Source
Eastern Europe and Central Asia *(cont'd.)*			
Slovenia	Legal for contraceptive reasons when person is aged 35; law also authorizes sterilization for health reasons	Health Commission must consent for health reasons	Law to implement free choice in birth of children (1977)
North Africa and the Middle East			
Afghanistan	Unclear		
Algeria	Unclear		
Bahrain	Unclear		
Egypt	Unclear		
Iran	Unclear (yet promoted by government for family planning purposes)		
Iraq	Unclear (restrictions were reportedly cancelled in 1980)		
Israel	Legal for contraceptive reasons	No consent requirements	National Health Insurance Law (1994)
Jordan	Unclear		
Kuwait	Unclear		
Lebanon	Unclear		
Morocco	Unclear		
Oman	Unclear		
Saudi Arabia	Legal for therapeutic reasons only		Uncodified Islamic law in force
Syria	Unclear		
Tunisia	Legal for contraceptive reasons when person has four children		Presidential statement (1973)
Turkey	Legal for contraceptive reasons	Spouse	Law on population planning (1983)
Yemen	Unclear		
Sub-Saharan Africa			
Angola	Unclear		
Benin	Unclear		
Botswana	Legal for contraceptive reasons		By interpretation of existing law or regulation
Burkina Faso	Unclear		
Burundi	Unclear		
Cameroon	Unclear		
Central African Republic	Unclear		
Chad	Unclear		
Congo, Democratic Republic of (Zaire)	Unclear		
Côte d'Ivoire	Unclear		
Ethiopia	Unclear (yet sterilization is widely practiced as a family planning measure, with no requirements)		
Gambia	Unclear		

(cont'd.)

Supplement 4.1. Current legal status of sterilization, any consent requirements, and source of information on status, by country *(cont'd.)*

Country	Current status	Consent needed (other than from client)	Source
Sub-Saharan Africa *(cont'd.)*			
Ghana	Legal for contraceptive reasons		Ministry of Health Reproductive Health Services Policy (1996)
Guinea	Unclear		
Kenya	Legal for contraceptive reasons		Population Policy Guidelines (1986) (implied)
Lesotho	Legal for contraceptive reasons		Population policy (1994) (feature of policy)
Liberia	Unclear		
Madagascar	Unclear		
Malawi	Unclear		
Mali	Unclear		
Mauritania	Unclear		
Mauritius	Unclear		
Mozambique	Unclear		
Niger	Legal for contraceptive reasons when woman is aged 35 with four children or when man has six children; ordinance also authorizes sterilization when woman's life is endangered	Spouse	Ordinance on contraception (1988)
Nigeria	Legal for contraceptive reasons; also permitted for health and eugenic reasons		Official Report of the Nigerian Government (1992)
Rwanda	Legal for health reasons only; person must have three children	Spouse	Instruction on maternal and child health and family planning (1986)
Senegal	Unclear (yet performed)		
Sierra Leone	Unclear		
Somalia	Unclear		
South Africa	Legal for contraceptive reasons	No consent requirements	Sterilization Act (1998)
Sudan	Legal for medical reasons only		Decree on population policy (1990)
Swaziland	Unclear (yet performed)		
Tanzania	Legal for contraceptive reasons		Policy Guidelines on Family Planning (1994)
Togo	Unclear		
Uganda	Legal for contraceptive reasons	Spousal consent is required (implied)	Policy Guidelines on Family Planning (1993)
Zambia	Legal for contraceptive reasons		
Zimbabwe	Legal for contraceptive and therapeutic reasons		National Family Planning Council Act (1985) (implied)

Notes: Empty space means that no information was found. Almost all countries that allow sterilization for contraceptive purposes allow it for other purposes as well. These purposes have been noted only when the specific law authorizing sterilization mentions them.

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Chapter 5

Factors Influencing Sterilization Use and Outcomes

Highlights:

- Socioeconomic status and the decision to choose sterilization as a contraceptive method do not appear to be associated. There are regional differences, however: In places such as Bangladesh and India, the likelihood of sterilization is greater among couples of lower socioeconomic status, while in Latin America and the Caribbean, couples of higher socioeconomic status are more likely to use sterilization.
- Sterilization users frequently say they chose sterilization for economic reasons or because they had all the children they wanted, although they also attribute their decision to issues such as problems with other contraceptive methods, health factors (such as problems with the last pregnancy) or medical reasons, and method failure.
- Much of the literature suggests that regret is generally low among sterilization users, although rates are high in a few places. Across studies, regret rates range from about 7% in Colombia and the United States to about 17% in Bangladesh and the Dominican Republic.
- Risk factors for sterilization regret can generally be divided into three categories: client characteristics (such as age at sterilization and marital stability), circumstances at the time of sterilization, and changes in clients' characteristics or circumstances after the procedure.

In 1985, EngenderHealth (then the Association for Voluntary Sterilization) commissioned a review and critical analysis of existing literature on voluntary sterilization, to be included in its international fact book on sterilization (Ross, Hong, & Huber, 1985). The summary and findings of that review (Philliber & Philliber, 1985) have for many years provided the most comprehensive overview of studies on sterilization use worldwide.

In summary, the review found that socioeconomic status and religion have little impact on the decision to choose sterilization, but that partners' encouragement and influence do. In terms of outcomes, most sterilization users report being satisfied with the procedure and having experienced little or no change in their sexual activity or marital relations following sterilization; regret is also relatively rare. Risk factors for negative outcomes (such as regret or dissatisfaction) include coercion during decision making, unhappy marital relations, a lack of information about the procedure, and complications resulting from the procedure.

Over the past 15 years, other literature reviews on facets of sterilization have been conducted. Chi and Thapa (1993), for example, examined worldwide literature on postpartum sterilization. Chi and Jones (1994) focused their global analysis on risk factors for poststerilization regret in women. In 1998, EngenderHealth (then AVSC International) conducted a review of the literature on sterilization decision-making factors and outcomes among female users in 17 Latin American and Caribbean nations.[1] Although these works have contributed to the synthesis of knowledge on the antecedents and re-

[1] Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Puerto Rico, and Trinidad and Tobago.

sults of the sterilization choice, their scope has been somewhat limited, either geographically or thematically.

To gain a better understanding of sterilization-related research in the last 15 years, EngenderHealth staff reviewed the informational database Popline® to identify new research on this topic. The review, which was global in focus, examined decision-making factors and outcomes for both female and male sterilization, as identified in both quantitative and qualitative research.[2] In addition, information from a few selected, unpublished EngenderHealth reports was also included.

This chapter summarizes selected literature on female and male sterilization published since 1985. We consider if the findings of newer research are inconsistent with those identified in the previous global review. In addition, we assess the extent to which the more recent body of literature has addressed the gaps identified by Philliber and Philliber (1985) and identify new areas for future social science research in sterilization.

Factors Influencing Sterilization Use

Myriad factors can influence a couple's decision to end childbearing by means of sterilization. Users' characteristics, societal norms, religious beliefs, family planning policies, economics, fear of child mortality, the sex of living children, and pressure from the partner or family to have more children are some of the factors considered when examining decision making for sterilization.

To augment the data on characteristics of sterilization users drawn from standardized population-based surveys (see Chapter 3) and illustrate the broad range of variables covered, this chapter presents research focusing on additional characteristics of sterilization users. Moreover, most of the information is derived from special studies, which tend to have smaller sample sizes; as a result, this chapter includes findings from studies on vasectomy that, because of the small number of users, might otherwise not be available in population-based studies.

Socioeconomic status

In their 1985 review of the literature, Philliber and Philliber could draw no overarching conclusion about the association between socioeconomic status and the decision to choose sterilization as a contraceptive method. Certain regional patterns emerged, however. The likelihood of sterilization increased with lower socioeconomic status in Bangladesh and India, while higher socioeconomic status was associated with a greater likelihood of sterilization use in Latin America and the Caribbean. In the United States, female sterilization use was more likely among those of lower socioeconomic status, whereas male sterilization use was more common among couples of higher social and economic means.

More recent studies appear to corroborate many of these findings (Table 5.1). Socioeconomic status drops out as a predictor of sterilization use in multivariate analyses, supporting the conclusion that sterilization is not affected by socioeconomic status (Groat, Neal, & Wicks, 1987; Hunt & Annandale, 1990; Miller, Shain, & Pasta, 1986). No overarching pattern is identifiable. In the United States, vasectomy use continues to be associated with higher socioeconomic status (Abma et al., 1997), whereas reliance on female sterilization is linked with lower socioeconomic status (Bumpass, Thomson, & Godecker, 2000; Chandra, 1998; Cushman et al., 1988). Some researchers have speculated that these disparities exist because tubal ligation is easily available in both the private and public sector, while vasectomy is less available in the public sector (Luick et al., 2000). In studies conducted in the Dominican Republic, India, and Nicaragua, no

[2] In the reference list at the end of this chapter, we have noted the type of approach to data collection used in each study cited. Information from qualitative studies should not be considered generalizable data, but is instead presented to add to the breadth of findings.

Table 5.1. Key findings on relationship between sterilization use, socioeconomic status, and education, by study country, study population, results, and source

Country	Population	Socioeconomic status	Education	Source
Bangladesh	Female tubal ligation users		Largest percentage (83%) had no education	Landry, 1990
Bangladesh*	Couples using vasectomy		More than half of male users had at least some secondary education	Landry & Ward, 1997
Brazil, Colombia, and Mexico	Male vasectomy users		At least some had secondary education	Vernon, 1996
Colombia	Female tubal ligation users		Largest percentage had 1–3 years of education	Williams, Ojeda, & Trias, 1990
Colombia	Female tubal ligation users		Largest percentage (56%) had primary education	Landry, 1990
Colombia†	Female tubal ligation users		Largest percentage (52%) had secondary education or higher	Landry et al., 1992
Dominican Republic†	Female tubal ligation users		Largest percentage (65%) had primary education	Landry et al., 1992
Dominican Republic	Female tubal ligation users	Sterilization distributed equally across all socioeconomic levels	34% had 5–8 years of education and 31% had 1–4 years of education	Loaiza, 1995
El Salvador	Female tubal ligation users		Largest percentage (42%) had 4–6 years of education	Bertrand, Landry, & Zelaya, 1986
El Salvador	Female tubal ligation users		Largest percentage (56%) had primary education	Landry, 1990
Guatemala	Female tubal ligation users		Largest percentage (55%) had primary education	Landry, 1990
India†	Female tubal ligation users		Largest percentage (46%) had no education	Landry et al., 1992
India	Population at large (one community)	No relationship identified between socioeconomic status and sterilization use	No significant difference between users and nonusers of sterilization	Dharmalingam, 1995
Indonesia	Female tubal ligation users		Largest percentage (50%) had primary education	Landry, 1990
Kenya*	Couples using vasectomy		More than half of male users had at least some secondary education	Landry & Ward, 1997
Kenya†	Female tubal ligation users		Largest percentage (53%) had primary education	Landry et al., 1992
Latin America and the Caribbean‡	Female tubal ligation users		Majority had at least some primary school education	AVSC International, 1998
Mali	Female tubal ligation users		Largest percentage (58%) had no education	Landry et al., 1992
Mexico*	Couples using vasectomy		Majority had at least one year of secondary education	Alarcon et al., 1995
Mexico*	Couples using vasectomy		More than half had at least some secondary education	Landry & Ward, 1997
Nepal	Female tubal ligation users		Largest percentage (79%) had no schooling	Thapa & Friedman, 1998

(cont'd.)

Table 5.1. Key findings on relationship between sterilization use, socioeconomic status, and education, by study country, study population, results, and source *(cont'd.)*

Country	Population	Socioeconomic status	Education	Source
Nicaragua	Population at large	No significant difference between users and nonusers of sterilization		Zelaya et al., 1996
Puerto Rico	Female tubal ligation users		43% had 0–8 years of education; 23% had a high school diploma only	Boring, Rochat, & Becerra, 1988
Rwanda*	Couples using vasectomy		Majority of male users had completed some level of primary education	Landry & Ward, 1997
Scotland	Female population at large	Inverse relationship between sterilization use and socioeconomic status (significant in univariate analysis, but not in multivariate analysis)		Hunt & Annandale, 1990
Senegal	Female tubal ligation and Norplant implant users		Largest percentage of tubal ligation users (63%) had no education	Diadhiou et al., 1994
Sri Lanka	Couples using vasectomy		Majority of male users had completed some level of primary education	Landry & Ward, 1997
Tunisia	Female tubal ligation users		Largest percentage (75%) had no education	Landry, 1990
Turkey	Female tubal ligation users		Largest percentage (77%) had primary education	Landry et al., 1992
United States	Female vasectomy and tubal ligation users	No significant difference between female vasectomy and tubal ligation users		Shain, Miller, & Holden, 1985
United States	Population at large (married couples in one city)		Education was not a predictor of use vs. nonuse; education was a predictor in choice of sterilization (husband's higher education was associated with vasectomy use)	Groat, Neal, & Wicks, 1987
United States	Female tubal ligation users and nonusers wanting no more children	Inverse relationship between sterilization and socioeconomic status (significant difference)		Cushman et al., 1988
United States	Couples using vasectomy		All but two male users had completed secondary school	Landry & Ward, 1997
United States	Male vasectomy users	Average annual income of male users was $50,000–$75,000	48% had bachelor's degree or higher; almost all had completed high school	Luick et al., 2000

* Qualitative study.

† Study was limited to postpartum women.

‡ Bolivia, Brazil, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, and Trinidad and Tobago.

Note: Empty space indicates that the study did not report information on the variable.

conclusive evidence linked socioeconomic status to sterilization use (Dharmalingam, 1995; Loaiza, 1995; Zelaya et al., 1996).

Religion

Sterilization is used by people from a broad variety of religious faiths (Bertrand et al., 1991; Campos Machado, 1996; Cleland & Mauldin, 1991; Hunt & Annandale, 1990; Khan & Patel, 1997; Stycos, 1984). In some cases, even though a religion may restrict or forbid the use of sterilization as a family planning method, followers will still use it. For example, even though Roman Catholicism prohibits use of contraceptive sterilization, the method is widely used in the overwhelmingly Catholic Latin American and Caribbean region (Stycos, 1984).

Opposition to the use of sterilization also has been noted among Muslim groups in India and the Philippines (Population Council, 1993; Khan & Patel, 1997). Many countries where sterilization prevalence is low are located in the Middle East, in North Africa, and in Sub-Saharan Africa. The low prevalence in these countries may be a product of sterilization policies based on the strict interpretation of Islam or on individual opposition to sterilization. (See Chapter 4 for more information on sterilization within Islamic law.) Nevertheless, in a few predominantly Muslim countries, such as Bangladesh and Tunisia, sterilization represents a fair portion of contraceptive use.[3]

A few recent studies have used multivariate analysis to explore the importance of religion in sterilization decision making. Among these, an analysis of 1995 U.S. data from the National Survey of Family Growth (NSFG) found a significantly lower likelihood of tubal sterilization among Catholic wives than among non-Catholic wives (Bumpass et al., 2000). In Hunt and Annandale's study of women in Scotland (1990), the association between being Protestant and not choosing sterilization was strong in the bivariate analysis, but disappeared in the multivariate models.

Marital or union status

In general, most women and men who use sterilization tend to be in union, though this may reflect the study populations chosen, since nearly all studies that we examined focused on women in union. One U.S. study indicated that married women were more likely to use a permanent method than were unmarried women—48% and 11%, respectively (Forrest & Fordyce, 1993). Nevertheless, sterilizations among unmarried women do not appear to be unusual; another U.S. study found that one in three sterilizations took place among unmarried women (Bumpass et al., 2000).[4] Table 5.2 (page 112) indicates the marital or union status of participants in recent studies on sterilization use.

Number of children

According to Philliber and Philliber (1985), sterilization is most common among high-parity couples. Couples in Asia and Latin America who used sterilization averaged 4–5 children, whereas those in Canada, Europe, and the United States had smaller families. Although the differences between developed and developing regions largely continue today, recent literature suggests that the gap between regions has narrowed. The number of living children among sterilization users in Asia and Latin America now peaks at 3–4 rather than at 4–5. In fact, in Brazil, Colombia, and the Dominican Republic, a large number of sterilization users report having been sterilized after 2–3 children (AVSC International, 1998b; Loaiza, 1995). Sterilization users in

[3] In Bangladesh, data from the 1996 Demographic and Health Survey indicate that sterilization represents nearly 50% of all contraceptive use. In Tunisia, the 1994 PAPCHILD survey shows that close to 60% of contraceptive use can be attributed to sterilization (see Chapter 2).

[4] In this study, the "unmarried" category combined women who were never married with those who were formerly married and who were cohabiting (either formerly married or never married).

Table 5.2. Key findings on relationship between sterilization use and selected life-cycle variables, by study country, study population, results, and source

Country	Population studied	Age at sterilization	Marital/union status	Presence of son/daughter	Source
Bangladesh	Female users of tubal ligation			Respondents averaged 2.1 male children and 1.8 female children	Landry, 1990
Bangladesh*	Couples using vasectomy			Majority had children of both sexes	Landry & Ward, 1997
Brazil	Female users and nonusers of tubal ligation		86% were in union; 67% of nonusers were married		Barbosa & Villela, 1995
Brazil	Female users of tubal ligation	In Alcantil, 37% were 25–29, 26% were 30–34; in Caapora, 34% were 20–24, 33% were 25–29			Rodrigues & Moji, 1995
Brazil	Female users of tubal ligation	Median of 28; 94% were <35; 65% were <30	93% were in union		Vieira & Ford, 1996
Brazil, Colombia, and Mexico	Vasectomy users		Nearly all were in union		Vernon, 1996
Colombia	Female users of tubal ligation			Respondents averaged 1.8 male children and 1.6 female children	Landry, 1990
Dominican Republic	Female users of tubal ligation	When sterilized, 36% were 25–29, 28% were 30–34, 23% were 20–24			Loaiza, 1995
El Salvador	Female users of tubal ligation	Mean of 28	63% were in union		Bertrand, Landry, & Zelaya, 1986
Guatemala	Female users of tubal ligation			Respondents averaged 2.2 male children and 2.1 female children	Landry, 1990
India	Population at large (one community)	Half were 30–39, half were 20–29			Dharmalingam, 1995
Indonesia	Female users of tubal ligation			Respondents averaged 2.4 male children and 2.3 female children	Landry, 1990
Kenya*	Couples using vasectomy			Majority had children of both sexes	Landry & Ward, 1997
Latin America and the Caribbean†	Female users of tubal ligation	Majority were sterilized at 25–34			AVSC International, 1998b
Mexico*	Vasectomy users and their wives	Mean of 31			Alarcon et al., 1995
Mexico*	Couples using vasectomy			Majority had children of both sexes	Landry & Ward, 1997
Nepal	Female users of tubal ligation	36% were 25–29; 25% were 15–24; 21% were 30–34		74.5% had at least one son and 68.4% had at least one daughter	Thapa & Friedman, 1998

(cont'd.)

Table 5.2. Key findings on relationship between sterilization use and selected life-cycle variables, by study country, study population, results, and source *(cont'd.)*

Country	Population studied	Age at sterilization	Marital/union status	Presence of son/daughter	Source
Rwanda*	Couples using vasectomy			Majority had children of both sexes	Landry & Ward, 1997
Sri Lanka*	Couples using vasectomy			Majority had children of both sexes	Landry & Ward, 1997
Sweden	Male users of vasectomy	Mean of 39	98% were in union		Ehn & Liljestrand, 1995
United States	Female users of vasectomy and tubal ligation	Tubal ligation users were about 1 year older than vasectomy users			Shain, Miller, & Holden, 1985
United States	Female users of vasectomy and tubal ligation		Yes		Miller, Shain, & Pasta, 1986
United States	Female users and nonusers of tubal ligation, both of whom wanted no more children	Mean of 28.4 for both those planning and those not planning to be sterilized			Cushman et al., 1988
United States	Female users of tubal ligation	30% were 30–34; 28% were 25–29; 26% were 34 or older	63% were in union		Wilcox et al., 1991
United States	Couples using vasectomy or tubal ligation	Mean of 32.5			Miller, Shain, & Pasta, 1991a
United States	Couples using vasectomy or tubal ligation	Mean of 32.5			Miller, Shain, & Pasta, 1991b
United States*	Couples using vasectomy			Majority had children of both sexes	Landry & Ward, 1997
United States	Female population at large		Significantly high proportions of tubal ligation among unmarried women; 1 in 3 overall, 1 in 5 among white, non-Hispanic women, 2 in 3 among black women		Bumpass, Thomson, & Godecker, 2000
United States	Male users of vasectomy	Mean of 35.6	91% were in union		Luick et al., 2000
Zaire‡	Female users of tubal ligation	Mean of 36.9	92% were in union	98% had at least one son and one daughter	Bertrand et al., 1991

* Qualitative study.

† Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, and Trinidad and Tobago.

‡ Now the Democratic Republic of Congo.

Note: Empty space indicates that the study did not report information on the variable.

Africa report higher numbers of living children than do those in Asia and Latin America, with numbers among African women averaging five or more (Bertrand et al., 1991; Diadhiou et al., 1994).

Among users of permanent methods, vasectomy users appear to have fewer children than do tubal ligation users. Among vasectomy users in Brazil, Colombia, and Mexico, for example, researchers found that clients had fewer than three children (Vernon, 1996). In Miller, Shain, and Pasta's U.S. study (1986), those relying on vasectomy had fewer living children (2.1) than did those using female sterilization (2.4).

Sex of children

Coupled with parity, the sex of children also continues to remain an important factor affecting the choice of sterilization. Sterilization users in a number of studies and across countries (including Bangladesh, Colombia, Guatemala, Indonesia, Kenya, Mexico, Nepal, Rwanda, Sri Lanka, the United States, and Zaire, now the Democratic Republic of Congo) had at least one child of each sex (Bertrand et al., 1991; Landry, 1990; Landry & Ward, 1997; Thapa & Friedman, 1998). Table 5.2 indicates the presence of a son or a daughter among sterilization users in recent studies.

Age at sterilization

In general, population-based survey data show the median age at sterilization for female users to be somewhat higher in Africa than it is in Asia, Latin America and the Caribbean, and North America. (See Chapter 3 for more information.) Most men who use vasectomy report having been in their mid-to-late 30s when they underwent the procedure (see Table 5.2).

Among U.S. researchers who have examined differences in age at sterilization between users of tubal ligation and vasectomy, Shain, Miller, and Holden (1985) found that married women undergoing tubal ligation were approximately one year older than wives of vasectomy users. A study examining findings from the 1995 NSFG found that vasectomy is more common among the husbands of women who are in their late 20s; in general, tubal sterilization is more common among women who have younger husbands (Bumpass et al., 2000).

There also are differences in age at sterilization between postpartum and interval tubal ligation clients in the United States (MacKay et al., 2001). The authors of that study concluded that postpartum sterilizations were highest among women aged 25–29, while interval sterilizations were highest among those aged 30–34. Researchers suggest that this trend reflects childbearing trends, in which most women have the number of children they want by age 35.

Race and ethnicity

Most research examining the importance of race and ethnicity as factors in sterilization use has been undertaken in the United States (Table 5.3). Although race is not identified as a predictive factor in the decision to choose sterilization, it is related to the type of sterilization chosen (Chandra, 1998). Female sterilization remains widely used among black, Hispanic, and white women alike, but is most common among black women (Mosher & Pratt, 1990). Within this group, tubal sterilization is common among both married (37%) and never-married women (31%). Although Cushman et al. (1988) also studied U.S. women, they observed a different relationship, with female sterilization use highest among white and Hispanic women and lowest among black women; the authors speculate that differences in social class may have contributed to this discrepancy. A comparison of island-born and U.S. mainland–born Puerto Rican women with the population of sterilization users at large revealed that Puerto Rican women born on the U.S. mainland rely on sterilization at a rate comparable to that of the U.S. population, whereas island-born Puerto Rican women have higher rates (Salvo, Powers, & Cooney, 1992). The authors recommended additional research to determine if these differences

Table 5.3. Key findings on relationship between sterilization use and race and ethnicity, by study country, study population, results, and source

Country	Population studied	Race and ethnicity	Source
Australia	Lebanese, Turkish, and Vietnamese immigrant women	15–16% of Lebanese and Turkish immigrant women and 9% of Vietnamese women had undergone sterilization, compared with a higher percentage among Australian women; only two women (both Vietnamese) reported using vasectomy	Yusuf et al., 1993
Puerto Rico and United States	Puerto Rican women in New York and in Puerto Rico	30% of Puerto Rican women born in the New York area were using tubal ligation, compared with 26% born in Puerto Rico and 13% of all U.S. women; 0.1% of Puerto Rican women born in the New York area reported using vasectomy, compared with 3% born in Puerto Rico and 6.1% of all U.S. women	Salvo, Powers, & Cooney, 1992
United States	Female tubal ligation users and nonusers, both of whom wanted no more children	Percentage of women planning to use sterilization was higher among Hispanics and whites than among blacks, who were in the majority (62%)	Cushman et al., 1988
United States	Couples using vasectomy and tubal ligation	71% were white, 13% were Hispanic, 8% were Asian, 3% were black, and 5% were "other"	Miller et al., 1991
United States	Population at large	Black men were less likely to use vasectomy than were white men (1% vs. 10%)	Abma et al., 1997
United States	Female users of tubal ligation	Rates of postpartum and interval sterilization were higher for black women than for white women, but only rates for postpartum sterilization were significant	MacKay et al., 2001
United States	Male users of vasectomy	90% of vasectomy users were white, 5% were black, and 5% were Hispanic	Luick et al., 2000

are cultural, are related to socioeconomic status, or are caused by variations in the availability of methods and services.

A study of tubal ligation clients in the United States between 1994 and 1996 (MacKay et al., 2001) determined that postpartum and interval sterilization rates were higher for black women than for white women; however, only the differences in postpartum rates were found to be statistically significant. The researchers suggest that these race-related differences in sterilization rates may be linked to white women's greater reliance on vasectomy than on tubal ligation (9.8% vs. 1.2%).

In the United States, male sterilization is used most widely by white men. Bumpass et al. (2000) found that while use of vasectomy among white men has grown over time, it has remained fairly steady among black men. They suggested that black women's greater use of tubal sterilization than vasectomy may be linked to the higher prevalence of female-headed households. Other reasons for the lower use of vasectomy services among black men include a lack of information about vasectomy, a lack of available vasectomy services in the public sector (which mostly serves minority groups), and traditions in the black and Hispanic community, where women have historically borne the responsibility for family planning (Luick et al., 2000).

Social and psychological factors

Regardless of geography, sterilization users frequently say they chose sterilization for economic reasons or because they had all the children they wanted (Alarcon et al., 1995; Bertrand et al., 1991; Diadhiou et al., 1994; Hunt & Annandale, 1990; Landry & Ward, 1997; Loaiza, 1995; Mumford, 1983; Vieira & Ford, 1996; Williams, Ojeda, & Trias, 1990). Problems with other contraceptive methods, health factors (such as problems with the last pregnancy) or medical reasons, and method failure are also mentioned, though to a lesser extent (Alarcon et al., 1995; Barbosa & Villela, 1995; Bertrand et al., 1991;

Chibalonza, Chirhamolekwa, & Bertrand, 1989; Diadhiou et al., 1994; Ehn & Liljestrand, 1995; Hunt & Annandale, 1990; Landry, 1990; Landry & Ward, 1997; Loaiza, 1995; Luick et al., 2000; Miller, Shain, and Pasta, 1991b; Vieira & Ford, 1996; Williams et al., 1990). These factors only partly describe why people choose sterilization, however. As Philliber and Philliber (1985) note, "people cannot always explain why they decide to have a sterilization, and often they give superficial reasons." Further understanding requires additional knowledge about sources of influence, about information on and attitudes toward sterilization, and about alternative contraceptive methods, among other factors.

Sources of information and influence

Among tubal ligation users in Brazil, Colombia, Kenya, and the United States, friends, relatives, other sterilization users, and health care workers (including family planning workers) appear to be important sources of information (Bertrand et al., 1991; Vieira & Ford, 1996; Williams et al., 1990). Many vasectomy users in Bangladesh, Brazil, Colombia, Kenya, Mexico, Rwanda, and the United States similarly noted the importance of "significant others" and health workers in providing them with information about the procedure (Alarcon et al., 1985; Landry & Ward, 1997; Luick et al., 2000; Vernon, 1996). In some countries, particularly those with vasectomy information campaigns (such as Bangladesh, Brazil, Colombia, Kenya, and Mexico), health care workers played a particularly prominent role as information-givers (Alarcon et al., 1995; Landry & Ward, 1997; Vernon, 1996). The importance of other vasectomy users was particularly highlighted in studies in the United States, as well as in Brazil, Colombia, and Mexico (Miller et al., 1991b; Mumford, 1983; Vernon, 1996). The media (television, radio, and, in the United States, the Internet) have also been cited as an important source of information among vasectomy users in Brazil, Colombia, Mexico, and the United States (Alarcon et al., 1995; Luick et al., 2000; Vernon, 1996).

Besides being sources of information, family, friends, and health care workers may also influence the decision to choose sterilization. Most female sterilization users participating in focus groups in Zaire stated that they chose sterilization upon the recommendation of health care providers, who suggested they obtain sterilization for medical reasons (Chibalonza et al., 1989); few women consulted with friends, as this decision was deemed a confidential one. In Nepal, women who were not using contraception noted that vasectomy was not an option because they feared family disapproval (Shrestha, Stoeckel, & Tuladhar, 1988). In rural Bangladesh, the likelihood of sterilization use within a household increases if the head of the extended family dwelling unit (or *bari*) himself has ever used contraception, either permanent or temporary (Kamal, 1996). Tubal ligation users in Senegal described their husbands as being influential in their decision to choose sterilization, while friends and neighbors played a minimal role (Diadhiou et al., 1994). In Colombia, two-thirds of female sterilization users identified their partner as the second most important influence in their decision-making process (citing themselves as most important) (Williams et al., 1990).

Male partners may also be influential in the decision not to choose sterilization. Among Honduran women who never fulfilled their plans for sterilization, about 50% of respondents in Tegucigalpa and 22% in San Pedro Sula reported that they did not obtain a sterilization because of their husband's opposition (Janowitz et al., 1985). Similarly, in Jamaica, among women who broke their appointments for sterilization, some stated that despite their desire to limit births, they felt unable to broach the issue of sterilization with their partner (Bailey et al., 1994).

Contraceptive knowledge and previous contraceptive experience

Chapter 3 provides information on prior contraceptive use among female sterilization users, as derived from population-based data. According to the literature, with a few exceptions, sterilization users generally know about and in many cases have used other methods (see Table 5.4). Landry's (1990) six-country review of female sterilization use (in

Table 5.4. Key findings on relationship between sterilization use and contraceptive knowledge and previous contraceptive experience, by study country, study population, results, and source

Country	Population studied	Knowledge of at least one other method	Previous contraceptive use	Experience with contraceptive failure	Source
Bangladesh	Female users of tubal ligation	100%	27%		Landry, 1990
Bangladesh*	Couples using vasectomy	Majority knew of another method	Majority had used a method		Landry & Ward, 1995
Brazil	Female users and nonusers of tubal ligation		42% of users and 37% of nonusers had used another method	47% of sterilized women, compared with 23% of nonusers	Barbosa & Villela, 1995
Brazil	Female users of tubal ligation	100%	85%	43%	Vieira & Ford, 1996
Brazil, Colombia, and Mexico	Male users of vasectomy		56–98%		Vernon, 1996
Colombia	Female users of tubal ligation	99%	78%		Williams et al., 1990
Dominican Republic	Female users of tubal ligation		67%		Loaiza, 1995
El Salvador	Female users of tubal ligation	98%	65%		Bertrand, Landry, & Zelaya, 1986
El Salvador	Female users of tubal ligation	98%	65%		Landry, 1990
Guatemala	Female users of tubal ligation	94%	58%		Landry, 1990
India	Population at large (one community)	Most were not aware	None		Dharmalingam, 1995

(cont'd.)

Bangladesh, Colombia, El Salvador, Guatemala, Indonesia, and Tunisia) noted that all respondents knew of at least one method besides tubal ligation, and about half in all countries except Bangladesh had previously used a contraceptive method (including withdrawal). In Colombia, 91% of tubal ligation users knew of other contraceptive methods, and 88% of those had used another method, usually the pill (46%) (Williams et al., 1990).[5]

Hunt and Annandale (1990) found high levels of prior experience with contraception, particularly with the intrauterine device (IUD) and the pill, among tubal ligation users in Scotland. Previous contraceptive experience was similar among wives of vasectomy users in that study, though these women used the IUD less often than did women relying on tubal sterilization. Some researchers attribute this association between pill or IUD use and sterilization use to the former methods' high effectiveness standard; when the desired parity has been met, only sterilization is deemed capable of exceeding that standard when clients have "little tolerance for failure" (Bumpass et al., 2000; Hunt & Annandale, 1990).

Studies in Kenya and the Dominican Republic similarly report that tubal ligation users know about and have experience with other contraceptive methods (Bertrand et al., 1989; Loaiza, 1995). In comparison, researchers in Nepal found prior use of contraception to be low, with about 80–82% of women reporting that female sterilization was the

[5] Knowledge of family planning in general is high among most women of reproductive age in Colombia, with more than 50% able to name nine contraceptive methods (Rutenberg et al., 1991).

Table 5.4. Key findings on relationship between sterilization use and contraceptive knowledge and previous contraceptive experience, by study country, study population, results, and source *(cont'd.)*

Country	Population studied	Knowledge of at least one other method	Previous contraceptive use	Experience with contraceptive failure	Source
Indonesia	Female users of tubal ligation	100%	73%		Landry, 1990
Kenya*	Couples using vasectomy	Most were aware	Majority had used another method		Landry & Ward, 1997
Latin America and the Caribbean†	Female users of tubal ligation		13–46% had only used sterilization		AVSC International, 1998
Mexico*	Couples using vasectomy		Majority had used another method		Alarcon et al., 1995
Mexico*	Husbands and wives using vasectomy	Most were aware	Majority had used another method		Landry & Ward, 1997
Nepal	Female users of tubal ligation	92% of those sterilized in the hospital; 92% of those sterilized in camps	19% had used another method, 20% of those sterilized in the hospital and 18% of those sterilized in camps		Thapa & Friedman, 1998
Rwanda*	Couples using vasectomy	Most were aware	Majority had used another method		Landry & Ward, 1997
Sri Lanka*	Couples using vasectomy	Most were aware	Majority had used another method		Landry & Ward, 1997
Tunisia	Female users of tubal ligation	98%	62%		Landry, 1990
United States*	Couples using vasectomy	Most were aware	Majority had used another method		Landry & Ward, 1997
Zaire‡	Female users of tubal ligation	96%	67%		Bertrand et al., 1991

* Qualitative study.

† Bolivia, Brazil, Colombia, the Dominican Republic, Guatemala, Paraguay, and Peru.

‡ Now the Democratic Republic of Congo.

Note: Empty space indicates that the study did not report information on the variable.

first method they had ever used (Thapa & Friedman, 1998). Landry and Ward (1997) found that among vasectomy users in six countries, knowledge of and prior use of other contraceptive methods was nearly universal; female and male respondents reported having used at least one other modern method, on average. Miller, Shain, and Pasta (1991b) observed in their U.S. study that methods previously used by vasectomy clients were usually those requiring greater male involvement and planning: Couples using vasectomy had primarily used methods such as the condom and the diaphragm, whereas those using tubal ligation were more likely to have used methods requiring less planning, such as the IUD or withdrawal.

Misconceptions and misinformation

Misconceptions and misinformation about tubal ligation, vasectomy, and other contraceptive methods may either encourage or discourage an individual's decision to utilize

sterilization. Misconceptions regarding vasectomy are the most notable. In a study conducted in Uttar Pradesh, India, men, women, and even providers stated that female sterilization is easier to perform and has fewer complications than vasectomy (Centre for Operations Research and Training, 2000). Focus-group participants in Nepal expressed similar concerns (Shrestha et al., 1988). Similarly, respondents participating in studies in Bangladesh, Brazil, Kenya, and Nepal expressed fears that men who obtained a vasectomy would experience physical and sexual impotence and would be less able to perform physical labor (Bertrand et al., 1989; Schuler, Hashemi, & Jenkins, 1995; Shrestha et al., 1988; Vieira & Ford, 1996).

Education is an important factor in clarifying myths about vasectomy (Guzman Garcia, Snow, & Aitken, 1994; Landry & Ward, 1997). Vasectomy users in Landry and Ward's six-country study (1997) observed that correct information from providers and from other vasectomized men was important in counteracting negative comments expressed by friends and family.

Misconceptions about tubal ligation also exist. Three out of 10 focus groups from one study in Mexico reported nervousness and insanity as two side effects related to female sterilization (Guzman Garcia et al., 1994). In Nepal, focus-group participants expressed concern that tubal ligation would physically weaken women (Shrestha et al., 1988). In the United States, a comparative study of prospective sterilization users and nonusers (Cushman et al., 1988) revealed a number of concerns among nonusers, including fear of scarring, loss of femininity, and emotional upset. Nearly one-third cited adverse effects from anesthesia as a concern. In addition, many of the women believed they would face logistical problems, such as the need for several clinic visits and high costs (even though public assistance would probably have covered the cost of the service for many of these women). Among women in Kenya, many stated that tubal ligation leads to diminished interest in sex (Bertrand et al., 1989).

Future expectations about life after the procedure may also influence women's decision to choose sterilization. In Zaire (now the Democratic Republic of Congo), users of temporary methods stated that they would continue using temporary methods, rather than a permanent one, because of the fear of being abandoned by their husbands (Chibalonza et al., 1989).

Positive expectations may also be associated with sterilization. In one U.S. study, for example, sterilized women were more likely than nonsterilized women to believe that having a sterilization procedure would improve their family life, facilitate their education and personal development, and better their sex life (Cushman et al., 1988). Researchers noted that some women may not realize these high expectations, resulting in disappointment, especially with the method.

In some instances, men and women may choose sterilization as a result of their perceptions, experiences, or information about other methods. The majority (70%) of women interviewed in a Brazilian study (Vieira & Ford, 1996) felt that sterilization is the only reliable method. Seventy-nine percent said that the condom is unreliable and 40% that oral contraceptives fail, even if taken properly; many of these perceptions may have been based on personal experiences with the method, especially given the fact that 43% reported they had experienced contraceptive failure with the pill. Sixty-four percent stated that all methods affect women's health. A study of physicians, also conducted in Brazil, indicated that physicians recommend tubal ligation or vasectomy to couples who fear side effects of other methods or want no more children (Bailey et al., 1991).[6] In Scotland, negative media coverage of the pill in the 1980s and 1990s was deemed a factor in the noted increase in sterilization use there (Hunt & Annandale, 1990).

Among women interviewed in Brazil and Mexico, sterilization becomes the method of choice because of its finality (Zelaya et al., 1996), the women's dissatisfaction with

[6] As was noted in Chapter 4, large numbers of sterilizations have been performed in Brazil, despite a lack of clarity over the procedure's legal status that existed until the 1996 enactment of a law permitting sterilization for contraceptive purposes.

or distrust of other methods (Grilo-Diniz, de Mello e Souza, & Portella, 1998), or the lack of access to other contraceptives (Ortiz-Ortega, Amuchástegui, & Rivas, 1998), especially where abortion is illegal and unsafe.

Factors related to gender, culture, and empowerment

In the past 15 years, a number of studies have examined sterilization and decision making within the scope of gender, culture, and empowerment. Men's and women's roles in society may affect the acceptability of both the decision to terminate fertility and the method chosen. As previously mentioned, husbands, family members, and health care providers are often cited as influential players in the decision-making process, and much of the literature reveals that power dynamics within these relationships—particularly between men and women—influence the decision-making process.

In Southern India, men's opposition to female sterilization stemmed from an attempt to maintain control over their wives (Dharmalingam, 1995). Men appeared to believe that female sterilization makes it easier for women to have extramarital relations, generating suspicion among husbands and general familial tension. Neither vasectomy nor the condom was a contraceptive option because of men's disapproval of these methods. In a study in six rural villages in Bangladesh, Schuler et al. (1995) described how women circumvent expressing their own desires for family planning, including sterilization, by telling their husbands that family planning workers recommended contraceptive use.

Power dynamics may also affect the type of permanent method that couples select. In Kenya, researchers found that most men and women whom they interviewed knew about vasectomy but never considered it an alternative method of sterilization because of assumptions about women's childbearing roles. Some reported that because Muslim law permits men to divorce and remarry, Muslim men would oppose vasectomy, since having the procedure done would close off any opportunity to have more children with new wives (Bertrand et al., 1989). In addition, some women never suggested vasectomy to their husbands because they feared their husbands would abuse them for discussing it. In Landry and Ward's six-country qualitative study of vasectomy use (1997), some vasectomy users in Bangladesh and Sri Lanka excluded their partners from the decision-making process because they considered themselves the heads of households and in charge of making those decisions.

In comparison, couples from Bangladesh, Kenya, Mexico, Rwanda, Sri Lanka, and the United States who were using vasectomy viewed contraceptive use within their relationship as an equitable pact. These couples perceived contraceptive use for birth spacing as the female partner's responsibility. Once family size was complete, it became the "man's turn" to contribute to family planning through the use of sterilization (Alderman, 1988; Groat et al., 1987; Landry & Ward, 1997; Luick et al., 2000).

Studies in Brazil, Honduras, and Mexico found that among female respondents, sterilization may represent an attempt to "take control over one's body and reproduction" (Grilo-Diniz et al., 1998; Ortiz-Ortega et al., 1998; Zelaya et al., 1996). Temporary methods may not be seen as an option at the onset of sexual relations, either because of the woman's inability to "negotiate more flexible forms of contraception," because she perceives contraception as "sinful," or because she sees herself fulfilling the traditional childbearing role deemed natural by her culture. After having at least two children, women assume a more active role in controlling their fertility, since they have completed their childbearing duties.

In many cultures, age or one's phase in life may be seen as a way of advancing one's position within existing power structures. Saavala (1999) found that female sterilization users in one southern Indian village were using the procedure as an artificial means of advancing their age. There, young women sought sterilization as a means of indirectly challenging their mothers-in-law and obtaining the prestige and seniority associated with the nonprocreative phase of life. This use of sterilization to advance one's age contributed to a trend toward younger age at sterilization in the community.

Informed choice and consent

Chapter 1 discusses many of the concepts as well as ethical and quality issues concerning informed choice and consent. In summary, informed choice refers to a client's health care decision making, made in an environment in which the client has full understanding, knowledge, and available options regarding treatment or methods. Coercion, incentives, payments, and quotas are a few of the more commonly discussed obstacles to full and voluntary decision making. Imbalances in power and knowledge (both within and outside of the health system), a lack of information, providers' adherence to medical models, and a lack of real method choice also undermine informed choice in sterilization decision making (AVSC International, 1999). It is worth noting that these obstacles may be products not only of the health system, but also of relationships in communities and families, as well as relationships between partners.

Within the context of sterilization, informed consent means that a user is aware of the nature of the sterilization procedure and grants his or her consent voluntarily, without "inducement, force, fraud, deceit, duress, bias, or other forms of coercion or misrepresentation" (AVSC International, 1998a). Allegations of informed consent abuses in sterilization have long existed. In the United States, until about World War II, women who were poor, disabled, or from non-European countries were sometimes sterilized involuntarily (Moskowitz, Jennings, & Callahan, 1995; Reilly, 1991). Many of these same groups also faced violations in such countries as Denmark, Japan, Norway, and Sweden (Anonymous, 1997; Ramsay, 2000). Bauza (1994) states that informed consent abuses occurred in Puerto Rico during the 1940s. One of the best-documented instances of abuse was in India during the 1970s, when women and men alike were sterilized during a series of campaigns (Saavala, 1999).

Over the past 15 years, newspaper articles have reported allegations of informed consent abuses among women and men in countries such as Bangladesh, El Salvador, Guatemala, Mexico, Peru, and the United States, among others. Abuses have also been reported in India, despite the elimination of sterilization campaigns. In response, a number of studies have examined voluntarism in the decision to choose sterilization (Bertrand, Landry, & Araya Zelaya, 1986; Bertrand et al., 1991; Cleland & Mauldin, 1991; Landry, 1990; Perea, 1994; Saavala, 1999). In general, these studies concluded that decisions about sterilization appear to have been made voluntarily, though exceptions do exist. Ten percent of sterilized women participating in a national survey in Mexico reported that they had not been involved in the process of choosing sterilization (Perea, 1994). One study in Guatemala reported pressure from husbands (Landry, 1990). In Zaire, 14% of female sterilization users interviewed reported that they had felt pressured to choose sterilization, with more than half indicating they were pressured by their husbands and 37% by their physicians (Bertrand et al., 1991).

Incentives and disincentives have also existed in a number of countries, such as Bangladesh, China, France, and India, as a means of either encouraging or discouraging small families (Freedman & Isaacs, 1993). These may be directed at both users and providers, and they may vary in type (e.g., as money or as goods) as well as in intent (as an outright means of influencing decisions or as compensation for lost time or employment). In general, the importance of incentives in motivating individuals to choose sterilization seems minimal, though this may be because only a few studies have explored this issue. For example, in India, Saavala (1999) found that the poor women interviewed reported that "undergoing sterilization just for the money would make no sense," because of the surgical risk of the procedure.

Payments to clients, rather than being considered incentives, are viewed as compensation for their time and travel. Two studies noted similar results in Bangladesh. In one (Landry, 1990), one-third of female users stated that although compensation contributed to their decision to choose sterilization, they would have done so regardless of whether the payment was available. In the other (Cleland & Mauldin, 1991), for users of both tubal ligation and vasectomy, monetary incentives were judged to act "as an additional spur to action, only when there is a latent desire to stop having more

children." Although money may contribute to the decision (a pattern noted more frequently among men than among women), it is rarely the only motivational factor. In addition, the study suggested that incentives offered to self-employed recruiters pose a greater threat to choice, since the recruiters will often provide inaccurate information about sterilization and promote this method exclusively.

Other barriers to informed choice are a lack of knowledge about and access to alternative contraceptive methods. Studies conducted in Bangladesh, Brazil, Colombia, El Salvador, Guatemala, Indonesia, Mexico, and Tunisia (Landry, 1990; Perea, 1994; Vieira & Ford, 1996) have cited a lack of information about alternative contraceptive methods (usually temporary methods). Also, a lack of awareness regarding the intended permanence of sterilization has been noted in Brazil, the Dominican Republic, and the United States (Cushman et al., 1988; Loaiza, 1995; Vieira & Ford, 1996).

Informed choice may also be compromised if adherence to medical models takes precedence over a full understanding of a client's needs and preferences (AVSC International, 1999). Physicians in Brazil appear to have recommended postpartum sterilization to "high-risk" maternity clients, in some cases without providing adequate counseling (Berquo et al., 1996; Marques, 1996). The risks of future pregnancy cited may include advancing age, a history of three or more cesareans, difficult deliveries, and chronic diseases (Berquo et al., 1996; Rodrigues & Moji, 1995). Although doctors who recommended sterilization for cliients with these risk factors may have been acting with the best of intentions, they may also have been limiting clients' choices by failing to explore a full range of options, including effective long-term reversible methods.

Commodity supply systems (including importation laws), pricing issues, the policy environment, and access to trained providers also may curtail the availability of different methods and limit choice (AVSC International, 1999). However, information on these factors is often hard to find. Cleland and Mauldin (1991) noted that cost and distance restrict the range of methods to which poor rural women in Bangladesh have access. Another study (AVSC International, 1998b) peripherally explored lack of method choice in Brazil as part of a larger study of sterilization decision making in Latin America and the Caribbean. Findings suggested that import regulations for IUDs and stringent condom testing requirements limited available family planning methods to two: female sterilization (although use of female sterilization at the time was limited to medical indications) and the pill. In Brazil, oral contraceptives can be purchased at pharmacies without a prescription; however, little or no counseling on side effects or proper use is provided. Not surprisingly, Brazilian sterilization users frequently report method failure and side effects (usually stemming from oral contraceptive use) as reasons for choosing tubal ligation (Vieira & Ford, 1996).

Decision-making process

Many factors identified as being antecedents of sterilization use comprise the elements of sterilization decision-making models. Mumford's model of vasectomy decision making (1983) is one such model. Within this model, couples proceed through several steps before choosing vasectomy: increased awareness of vasectomy, usually through discussions with other vasectomy users; a decision to have no more children; serious consideration of vasectomy; growing discontent with temporary methods, because of dissatisfaction with or fear of side effects or ineffectiveness; a decision that vasectomy is the best alternative; and a "scare," usually a missed period, an unintended pregnancy, or contraceptive side effects. The model also suggests that the overall decision-making process takes two years or more.

In general, the overall duration of the decision-making process may vary, and delays may also occur in getting a vasectomy, for such reasons as "fear of pain," cost, lack of availability, or inconvenience (Mumford, 1983). A "scare" may occur at this time, and represents the ultimate impetus in the decision to choose sterilization. Among vasectomy users in the United States, nearly 34% reported that their last child was mis-

timed or unwanted; about 7% reported having an unplanned pregnancy or a pregnancy scare (Luick et al., 2000).

Some studies have noted deviations from the model proposed by Mumford. Among vasectomy users in Mexico, many obtained information from the mass media (Alarcon et al., 1995); wives appear to have played a more prominent role as a source of information than did other vasectomy users. In addition, no pregnancy scare took place, and the duration of time during which vasectomy was seriously considered (as opposed to the entire decision-making process) was 2–20 months, a period considerably shorter than the Mumford model's two years or more. A shorter duration for this consideration process—of about four months—has also been noted in Brazil, Colombia, and Mexico (Vernon, 1996).

Miller, Shain, & Pasta (1991b) simplified Mumford's model into three steps, applying it to sterilization in general: Couples make the decision to end childbearing; they decide to use sterilization; they then choose between female or male sterilization. They further noted that motivations, attitudes, the nature of the decision-making process itself, and context all affect these processes.

As with the vasectomy model proposed by Mumford, delays may also occur in the decision to choose tubal ligation. Among tubal ligation users in Zaire, delays in the decision-making process occurred because one partner was indecisive. In some cases, these delays resulted in the birth of one or two more children (Bertrand et al., 1991).

Although the decision to choose a permanent method is often presented as a joint decision, some of the literature suggests that the decision to choose sterilization can be an autonomous one. In Nicaragua, Zelaya et al. (1996) compared men's and women's reports of sterilization prevalence and found that women reported greater use of female sterilization than did men; the researchers suggested that some men may be unaware that their partners are using sterilization. In Landry and Ward's six-country study (1997), Bangladeshi, Rwandan, and Sri Lankan vasectomy users often made the decision to choose sterilization on their own, excluding their partners; Rwandan men in the study justified their decisions on the basis of their roles as household heads.

The choice between female and male sterilization

Models that delineate the decision-making process usually include a step related to the decision to choose between male or female sterilization. Couples often decide together which partner will be sterilized, with those choosing vasectomy over female sterilization often stating that they did so because vasectomy is easier, safer, and more effective (Alarcon, 1995; Groat et al., 1985; Luick et al., 2000; Vernon, 1996). In Canada, Alderman's interviews with physicians as clients (1988) found that some respondents chose vasectomy over tubal ligation because of concerns about postprocedural syndromes with female sterilization. In Bangladesh, Kenya, Mexico, Rwanda, Sri Lanka, and the United States, Landry and Ward (1997) also observed that among a few couples, fear of female sterilization was an impetus for choosing vasectomy. Many men also expressed concern over their wives' health and a desire to assume more responsibility in family planning. Providers' recommendations against tubal ligation also were found to be a reason for choosing vasectomy in one U.S. study (Miller et al., 1991b).

Both men's and women's misconceptions about and fear of vasectomy, as well as the convenience of having this procedure immediately after delivery, are a few of the reasons individuals report for choosing tubal ligation instead of vasectomy. In Brazil, women's fears that vasectomy results in sexual impotence led them to choose tubal ligation, even though vasectomy was also available (Vieira & Ford, 1996). In a study of U.S. couples choosing tubal ligation or vasectomy, women whose husbands were fearful of vasectomy and its possible side effects were more likely to choose female sterilization over male sterilization (Miller et al., 1991b). Thirty-nine percent of women who sought tubal ligation in fact did so because their husband refused vasectomy. In other cases, women undergoing tubal ligation stated that female sterilization was a matter of

Couples often decide together which partner will be sterilized, with those choosing vasectomy over female sterilization often stating that they did so because vasectomy is easier, safer, and more effective.

convenience, since it was easier to have the procedure done at the same time as a delivery or a cesarean section.

Outcomes Related to Sterilization

Much of the literature on poststerilization experiences has examined postprocedure effects on sexual and marital relations, satisfaction and dissatisfaction, sterilization regret, and requests for reversal.

Impact on sexual and marital relations

In general, female and male sterilization users reported either no change in their sexual or marital relations or a change for the better, often because sterilization removed much of the anxiety related to the threat of an unintended pregnancy (Bertrand et al., 1989; Bertrand et al., 1991; Ehn & Liljestrand, 1995; Groat et al., 1987; Landry & Ward, 1997; Oddens, 1999; Williams et al., 1990).

Some studies have indicated that sterilization, particularly tubal ligation, might have had a negative impact on a few women's sexual and marital relations. Among sterilized women in Sao Paulo, Brazil, who reported a negative outcome related to sterilization, 19% said that it was more difficult for them to refuse sex with their partners, and 28% stated that their partners had grown more jealous of them (Barbosa & Villela, 1995), probably fearing that the women would become unfaithful. In one study in the former Zaire, 13% of wives who had a tubal ligation reported that their husbands engaged in extramarital affairs to have additional children (Bertrand et al., 1991).

Regret for and satisfaction with sterilization

Comparing and interpreting information on outcomes related to sterilization use is often a difficult task because of the range of terms used to measure these results. Some studies have specifically inquired about regret, asking respondents "Do you have any regret?" or "Do you regret being sterilized?" even though the term "regret" alone might be difficult to define (Loaiza, 1995). In one study in Sao Paolo, Brazil, participants themselves were asked to describe how they define regret. Some defined it as "feelings of sorrow, sadness and loss," sometimes mixed with other feelings, such as "grief over the death of a child or loss of future opportunities in life" (Vieira & Ford, 1996).

Other researchers have attempted to avoid using the term "regret," asking respondents instead whether they " . . . still think tubal sterilization as a permanent method of birth control was a good choice..?" or whether they "are pleased with ___ [the] decision to have had an operation that would keep ___ [them] from having any (more) children?" (Bertrand et al., 1991; Boring, Rochat, & Becerra, 1988; Loaiza, 1995; Wilcox et al., 1991).

"Satisfaction" with sterilization is another concept used to assess outcomes, though for some this term applies to short-term impact, since regret is usually related to more long-term changes, such as remarriage or the death of a child (Landry, 1990). In Loaiza's study of sterilization regret in the Dominican Republic (1995), regret and satisfaction were combined to form one composite indicator.

Besides differing definitions, other factors also contribute to the variability in measuring outcomes related to sterilization. Study samples sometimes exclude sterilized users who have experienced failures, which may lead to lower regret rates (Chi & Jones, 1994). In addition, the length of time following sterilization at which clients are interviewed tends to vary, with periods ranging from a few months to several years after the procedure (Boring et al., 1998). The prevalence of regret varies from country to country, largely as a function of the frequency of divorce and the age and parity at which most sterilizations occur.

On the whole, much of the literature suggests that regret is generally low among

users, though a few high rates were noted. Regret rates across studies ranged from about 7% in Colombia and the United States to about 17% in Bangladesh and the Dominican Republic (Loaiza, 1996; Population Council, 1996; Wilcox et al., 1991; Williams et al., 1990). According to the few existing longitudinal studies, regret rates also varied by the time that had passed since the procedure, though the conclusions regarding the direction of this relationship differed. In one U.S. study, couples relying on tubal ligation or vasectomy reported improved feelings about sterilization after three years, though the sterilization users expressed an increasing desire that their partner had had the sterilization instead (Miller, Shain, & Pasta, 1990). Ehn and Liljestrand's study of vasectomy clients in Sweden (1995) found that regret declined over time, presumably because many problems (pain, soreness, and sexual problems) had disappeared.

In comparison, Hillis et al. (1999) noted that the occurrence of regret increased from seven to 14 years postprocedure, particularly among women who were 30 or younger when sterilized. A few researchers also found that feelings surrounding sterilization can be transitory, with sterilization users expressing regret at least once over the course of multiple interviews (Ehn & Liljestrand, 1995; Miller et al., 1990; Wilcox et al., 1991). Warren et al.'s 1988 cross-national study of regret (in Panama, Puerto Rico, and the United States) found a direct relationship between regret or desire for reversal and time elapsed since the procedure.

Studies examining satisfaction among sterilization users suggest that users are largely satisfied with their decision to choose sterilization (Barbosa & Villela, 1995; Bertrand et al., 1989; Diadhiou et al., 1994; Landry, 1990; Loaiza, 1995; New ERA, 1996; Oddens, 1999; Vieira & Ford, 1996). Most female sterilization users interviewed in Senegal reported that they were satisfied with the method, explaining that they felt "peaceful" and "rested" because their risk of pregnancy had greatly diminished (Diadhiou et al., 1994). One comparative study of all contraceptive users in West Germany found that method dissatisfaction was lower among sterilization users (4%) than among those who had ever used oral contraceptives (14%), condoms (42%), IUDs (34%), and natural family planning (33%) (Oddens, 1999). In general, satisfaction rates among female respondents across studies ranged from 76% in Sao Paolo, Brazil, to 98% in Senegal (Diadhiou et al., 1994; Vieira & Ford, 1996). Vernon's study of vasectomy clients in Brazil, Colombia, and Mexico (1996) found that almost all men reported being satisfied with the procedure.

Among both men and women, one of the most common reasons for regret is the desire for more children, usually as the result of the death of a child or remarriage. Chi and Jones (1994) found loss of a child to be an important factor for regret in developing countries. In Colombia, the Democratic Republic of Congo (formerly Zaire), the Dominican Republic, Nepal, Puerto Rico, and Sweden, the most common reasons for regret were related to the desire for more children (including as the result of the death of a child) or regret about the inability to have any more children (Bertrand et al., 1991; Boring et al., 1988; Loaiza, 1995; Platz-Christensen et al., 1992; Thapa & Friedman, 1998; Williams et al., 1990). In Brazil, the majority of women reporting regret did so because they wanted to have a child of a particular sex, usually a girl (Vieira & Ford, 1996). A study in Puerto Rico found similar results, with women who had sons and no daughters more likely to express regret than women with daughters but no sons (Boring et al., 1988). Researchers in the Puerto Rican study noted that these results contradict Philliber and Philliber's findings associating regret with a lack of sons, suggesting that these differences may be due to the fact that much of the research reviewed in 1985 focused on Africa and Asia. However, one study in Asia found similar results: Bangladeshi women with daughters and sons were less likely to express regret than were those with children of one sex, reflecting a preference for a "balance" of sexes in children (Population Council, 1996).

Other reasons cited for regret include change in marital status, perceived side effects and health changes, and contraceptive failure (Bertrand et al., 1991; Boring et al., 1988; Chi & Jones, 1994; Chi & Thapa, 1993; Loaiza, 1995; Miller et al., 1990; Miller,

Among both men and women, one of the most common reasons for regret is the desire for more children, usually as the result of the death of a child or remarriage.

Shain, & Pasta, 1991a; Thapa & Friedman, 1998; Vieira & Ford, 1996). Religious misgivings were also cited, but less frequently (Bertrand et al., 1991; Boring et al., 1998; Chi & Jones, 1994; Loaiza, 1995; Thapa & Friedman, 1998; Vieira & Ford, 1996; Williams et al., 1990). Regret from the loss of fertility or perceived loss of interest in sexual relations following surgery has also been noted (Vieira & Ford, 1996). Zairian women in Bertrand et al.'s study (1991) indicated an association between those women expressing regret and those reporting that their husbands had tried to have children with other women.

Much of the literature also tends to agree on a number of key risk factors. In their review, Chi and Thapa (1994) noted that risk factors for sterilization regret can generally be divided into three categories: client characteristics at the time of sterilization (e.g., young age at sterilization and marital instability), circumstances at the time of sterilization (e.g., stress of difficult labor, abortion, or cesarean section, and someone else making the decision), and changes in clients' characteristics or circumstances after the procedure (e.g. remarriage, death of a child, or change in the desire for more children). Table 5.5 (page 128) describes risk factors for sterilization that were identified in the studies reviewed. Overall, young age at sterilization and changes in marital situation were the two most commonly noted predictors of sterilization regret.

Miller et al. (1991a) found that feelings of regret are not limited to the individual obtaining the procedure. Observing regret among husbands of tubal ligation users and among wives of vasectomy users, they noted that poor couple communication, perceived regret in the other individual, and dominance by one spouse in the decision are risk factors for regret among spouses of users of tubal ligation and vasectomy. Few other studies to date have examined regret for sterilization from the perspective of the nonsterilized partner.

Request for reversal

An estimated 2–6% of sterilized men and women in developed countries and 0.2% in developing countries seek information about sterilization reversal (Marcil-Gratton et al., 1988; Potts et al., 1999). In developing countries, the percentage of women potentially interested in the return of fertility is probably underestimated, given the inaccessibility of reversal services and the corresponding lack of knowledge about reversal. The authors of one study conducted in Brazil argued that because of the "objectivity" of the number of individuals who request sterilization reversal, estimates of regret should be based on this number (Hardy et al., 1996). However, in another Brazilian study, the researchers noted that doing so would largely underestimate the level of regret (Petta et al., 1995), since not all of those who regret the procedure will initiate consultations about reversal.

In many ways, the parallels between request for reversal and regret are indeed quite close. In their review of literature on sterilization regret for tubal ligation, Chi and Jones (1994) found similarities between factors related to regret and those related to requests for reversal. A younger age at sterilization, a change in marital status, influence or pressure from others (e.g., a spouse or partner), and sterilization for medical purposes were all associated with requests for reversal, as well as with the risk of regret. In one U.S. study, Schmidt et al. (2000) identified a 14-year cumulative probability of requesting reversal of 14% among female sterilization users, with the cumulative probability increasing to 40% among women who were aged 18–24 when they were sterilized.

Potts et al. (1999) drew similar conclusions from their study of male sterilization users, with increased vasectomy reversal among men sterilized when they were younger than 30. Reasons for requesting sterilization reversal largely mirrored those stated as reasons for regret: divorce and remarriage, the death of a spouse, the death of a child, a change of mind about family size, and (in the case of vasectomy) a desire to regain masculinity. Moreover, the risk of regretting a vasectomy was highest when the procedure was performed during an emotional crisis. These findings are echoed in a smaller study

conducted in England of tubal ligation and vasectomy clients: Participants stated they wanted a reversal because they had changed partners or wanted to increase family size (Rowlands & Feasey, 1992).

Addressing Gaps in Sterilization Research

Besides providing a comprehensive overview of sterilization decision making and the consequences of those decisions, Philliber and Philliber (1988) also offered a critical analysis of the research literature, highlighting gaps and needs for future research. They concluded that

> research on antecedents to voluntary sterilization has been more successful in demonstrating what is not important than what is. At this point, there is little reason to believe that the decision to have a voluntary sterilization is affected very much by socioeconomic status, culture, attitudes, or stages in the life cycle. [However,] researchers and practitioners alike continue to believe that these factors are what matter in the decision to be sterilized. They have failed, therefore, to pursue efforts in other directions. It is time to look at new variables.

To fill this gap, Philliber and Philliber called for research to examine the role of user characteristics, influences in decision-making, and outcomes related to the decision to choose sterilization. Rather than descriptive and retrospective studies, the body of literature on decision making should also include longitudinal studies that follow users through part of the decision-making process and then at different points after the procedure. To provide a more complete picture of the decision to choose sterilization, studies could also look at couples who do not choose sterilization or those who postpone the decision to use sterilization.

In general, much of today's research is predominantly descriptive and retrospective. A better understanding of why women and men opt for sterilization over other methods is still needed. Nevertheless, a few longitudinal and case-control studies have been carried out over the past 15 years. Groat, Neal, and Wicks (1987) interviewed married couples in one U.S. city within the first five years of their marriage and then 10 years later. Communication between couples and joint commitment to family planning were predictive factors affecting the decision to choose sterilization, as well as the method of sterilization chosen.

Another of these studies, conducted by Miller et al. (1990) in the United States, compared factors affecting decision making among non-Hispanic white couples choosing vasectomy and among similar couples choosing tubal ligation, and looked at outcomes as well. In this study, most significant predictors of sterilization decision making were related to communication and to the decision-making dynamics of the couple, such as motivation to end childbearing and conflict and dominance during decision making. Through interviews with the same population three years later, the researchers observed that predictors for regret (in this case, regret among both the sterilized and the nonsterilized partner) were also aspects of couple dynamics.

The U.S. Collaborative Review of Sterilization (CREST), reported in Wilcox et al. (1991) and later in Hillis et al. (1999), is another longitudinal study on regret that looked at women before they underwent sterilization and then contacted them annually for 14 years after the procedure, to identify presterilization characteristics associated with regret. Young age at sterilization was found to be the strongest predictor of regret.

In the United States, in a prospective, longitudinal study of 1,200 poor women who were planning sterilization, Davidson et al. (1990) looked at reasons for failing to obtain a sterilization. Among women who had planned sterilization, 41% did not obtain the procedure. Reasons for not having done so were analyzed separately for women planning postpartum procedures and those planning interval procedures. Among postpartum women, the most common reason for not obtaining a sterilization included bureaucratic and institutional barriers, such as a lack of available staff or space, a loss of records, or payment problems (32%), followed by influence from others, including partners or

Table 5.5. Commonly cited presterilization and poststerilization risk factors for regret, by country

Country	Sex	Risk factor	Category*			Source
			Circumstances surrounding decision	Client characteristics at time of sterilization	Change of characteristics after sterilization	
Australia	M	Divorce and/or remarriage/new partner	. . .	. . .	X	Jequier, 1998
		Desire for more children	. . .	. . .	X	
Bangladesh	M, F	*Sterilized individual and nonsterilized partner*				Population Council, 1996
		Young age at sterilization	. . .	X	. . .	
		Regret at being unable to bear another child	. . .	. . .	X	
		Decision made by someone else	X	. . .	. . .	
		Did not want sterilization (wanted other method)	X	. . .	. . .	
		Too many children of one sex	. . .	X	. . .	
Bangladesh	F	Decision made by husband	X	. . .	. . .	Schuler et al., 1996
		Partner opposed to sterilization	X	. . .	. . .	
Brazil	F	Young age (<25)	. . .	X	. . .	Hardy et al., 1996
		Less information about the procedure	. . .	X	. . .	
		Fewer contraceptive methods known	. . .	X	. . .	
Brazil	F	Young age (<30)	. . .	X	. . .	Vieira & Ford, 1996
		Divorce and/or remarriage/new partner	. . .	. . .	X	
		Pressure to have sterilization	X	. . .	. . .	
		More years of education	. . .	X	. . .	
		Did not pay for sterilization	. . .	X	. . .	
		Previous contraceptive failure	. . .	X	. . .	
Canada	M	Divorce and/or remarriage/new partner	. . .	. . .	X	Alderman, 1991
Colombia	F	Widowed and/or remarried/new partner	. . .	. . .	X	Williams, Ojeda, & Trias, 1990
Denmark	M, F	Desire for more children	. . .	. . .	X	Kjersgaard et al., 1989
Dominican Republic	F	Young age (<30)	. . .	X	. . .	Loaiza, 1995
		Divorce and/or remarriage/new partner	. . .	. . .	X	
		Low parity (≤3 children)	. . .	X	. . .	
		Death of a child	. . .	. . .	X	
		Sterilization was first contraceptive	. . .	X	. . .	
Nepal	F	Death of a child	. . .	. . .	X	Thapa & Friedman, 1998
Puerto Rico	F	Young age (<25)	. . .	X	. . .	Boring, Rochat, & Becerra, 1988
		Divorce and/or remarriage/new partner	. . .	. . .	X	
		Decision made by someone else	X	. . .	. . .	
		Death of a child	. . .	. . .	X	
		Sterilized for medical reasons	X	. . .	. . .	
		Absence of a daughter	. . .	X	. . .	
Sri Lanka	F	Young age (<25)	. . .	X	. . .	Hapugalle et al., 1989
		Decision made by someone else	X	. . .	. . .	
		Death of a child	. . .	. . .	X	
		Low parity (≤2 children)	. . .	X	. . .	
		Absence of a child of each sex	. . .	X	. . .	
		Partner opposition to sterilization	X	. . .	. . .	
		Married <5 years	. . .	X	. . .	

(cont'd.)

Table 5.5. Commonly cited presterilization and poststerilization risk factors for regret, by country *(cont'd.)*

Country	Sex	Risk factor	Category*			Source
			Circumstances surrounding decision	Client characteristics at time of sterilization	Change of characteristics after sterilization	
Sweden	F	Young age (<30)	. . .	X	. . .	Platz-Christensen et al., 1992
		Desire for a child with a new partner	. . .	. . .	X	
Sweden	M	Divorce and/or remarriage/new partner	. . .	. . .	X	Ehn & Liljestrand, 1995
		Lack of information on alternatives	. . .	X	. . .	
		Desire for more children	. . .	. . .	X	
Thailand	F	Death of a child	. . .	. . .	X	Pitaktepsombati & Janowitz, 1991
		Low parity (fewer than preferred)	. . .	X	. . .	
		Concurrent cesarean section	X	. . .	. . .	
		Sterilization for medical reasons	X	. . .	. . .	
United States	F	Young age	. . .	X	. . .	Henshaw & Singh, 1986
United States	F	Young age (<30)	. . .	X	. . .	Wilcox et al., 1991
		Concurrent cesarean section	X	. . .	. . .	
		History of abortion	. . .	X	. . .	
		Use of public funds for sterilization	. . .	X	. . .	
United States	F	Young age (<30)	. . .	X	. . .	Hillis et al., 1999
		Divorce and/or remarriage/new partner	. . .	. . .	X	
		Decision without adequate consideration	X	. . .	. . .	
		Death of a child	. . .	. . .	X	
United States	F	Young age (<25)	. . .	X	. . .	Miller, Shain, & Pasta, 1991a
		Ambivalence about future childbearing	. . .	X	. . .	
		Negative attitudes toward sterilization	. . .	X	. . .	
		Partner dominated decision making	X	. . .	. . .	
		Partner conflict during decision making	X	X	. . .	
United States	M, F	*Sterilized partner*				Miller, Shain, & Pasta, 1991b
		Unresolved motivation for more children	. . .	X	. . .	
		Desire for more children	. . .	. . .	X	
		Nonsterilized partner				
		Partner conflict	X	. . .	. . .	
		Poor couple communication	X	. . .	. . .	
		Dominance by partner in decision making	X	. . .	. . .	
		Perceived regret of partner	. . .	. . .	X	
United States	F	Young age (<30)	. . .	X	. . .	Grubb et al., 1985
		Concurrent cesarean section	X	. . .	. . .	
Zaire†	F	Low parity (≤5 children)	. . .	X	. . .	Bertrand et al., 1991
		Pressure to have sterilization	X	. . .	. . .	
		Sterilization for medical reasons	X	. . .	. . .	
		Behavior change of partner	. . .	. . .	X	

* Major risk factors can be divided into three categories: those related to clients' characteristics at the time of sterilization, to the circumstances under which the sterilization is performed, and to changes in clients' characteristics after sterilization (Chi & Thapa, 1993).

† Now the Democratic Republic of Congo.

Future research should continue to probe into the attitudes of providers and should make use of data collection methods besides interviews (e.g., observations) to strengthen the quality of the data.

providers (26%), and fear of the procedure (17%). Women who had been planning interval procedures named influence or pressure from others, institutional and bureaucratic barriers, and fear of the procedure as reasons for the change in their plans. The authors noted that while 6% of those who obtained a sterilization later regretted the decision, 47% of those who did not obtain one experienced regret.

Janowitz et al. (1985) also examined unfulfilled plans for sterilization. Among women from two urban cities in Honduras who had been considering sterilization, the most commonly cited reasons for not obtaining one included spousal opposition, economic barriers (e.g., no money for the procedure), and time and family restrictions (e.g., a lack of time, inability to leave the family, or poor family health). In some cases, women did not undergo the procedure because they decided they wanted more children or they had separated from their partner and felt that there was no need to do so.

Providers' attitudes toward sterilization is an area that requires further research (AVSC International, 1998b), with much of what we know based on information collected from client interviews. However, in a few cases, other means of data collection, such as interviews with providers, have been conducted (Bailey et al., 1991; Centre for Operations Research and Training, 2000; Harrison & Cooke, 1988; Landry et al., 1992).

Future research should continue to probe into the attitudes of providers and should make use of data collection methods besides interviews (e.g., observations) to strengthen the quality of the data. As Bailey et al. (1991) found, provider interviews do not necessarily depict provider practices accurately: Most providers interviewed in Sao Paulo, Brazil, used sterilization themselves (including vasectomy) and would recommend both methods to clients. Most physicians' positive attitudes toward vasectomy failed to match the situation regarding sterilization in Brazil, where tubal ligation rather than vasectomy is the norm. Analysis of both qualitative and quantitative data from various sources would provide a clearer picture of whether providers do indeed recommend vasectomy to their clients.

Additional Needs in Sterilization Research

There is a clear continued need for a better understanding of why men and women choose sterilization rather than other methods, as well as for more longitudinal research on sterilization and for more studies on provider attitudes. However, the literature indicates that other gaps exist. For example, in recent years, the international dialogue on reproductive health has focused on the need for more comprehensive services. Researchers, program developers, and advocates have stressed that reproductive health services should be more integrated into the health sector, so that providers and clients alike use their interactions to explore more fully and attend to needs other than those that brought the client to seek services. Some women and men who use sterilization may see no need for reproductive health care once they have obtained the method and end their fertility (Cates & Stone, 1992).

The need to broaden reproductive health services is embedded in much of the existing sterilization literature. Chapter 1 describes some of the research that has examined the reproductive health needs of sterilization clients, and identifies challenges in providing continuity of care to sterilization clients who perceive minimal need for additional reproductive health services once their fertility ends.

Interactions with the health care system, such as at the time of the sterilization procedure, provide excellent opportunities to educate, screen, and treat clients. Screening for cervical cancer, for example, could be tied in with sterilization services. One study of 642 U.S. women who had cervical carcinoma found that increases in screening would have the "greatest potential effect in reducing the incidence rate of invasive cervical carcinoma" (Sung et al., 2000). The authors recommend encouraging screening among women of childbearing age, particularly when they receive antenatal or postpartum care. By extension, sterilization services could provide another opportunity, given that the same population of women of childbearing age is receiving care.

Another area meriting attention is that of sexually transmitted infections (STIs). Like many other family planning methods, sterilization fails to offer any protection against STIs, including HIV and AIDS. Landry and Ward's study (1997) among vasectomy users in Kenya, Mexico, and Rwanda found that although some men described protection against pregnancy with more than one partner as a benefit of vasectomy, none noted that having more than one partner would put them or their partners at increased risk for transmitting STIs. Among female sterilization users in Sao Paulo, Brazil, half believed that their partners were unfaithful to them, but refused to address the problem with their partners (Barbosa & Villela, 1995). Despite the extent to which these women had contact with men who were at risk for HIV and AIDS, few liked condoms, and none had used them during the month prior to the interviews. Nearly half of the sterilization users reported symptoms characteristic of an infection.

Additional research is necessary to learn about the reproductive health needs of sterilized men and women, such as cervical cancer and STIs, and then to identify the most effective ways to address them.

Informed choice and consent is another area warranting attention. Over the past 15 years, a number of allegations regarding informed consent abuses have emerged. In the future, researchers need to continue monitoring incentives, disincentives, targets, quotas, and allegations of coercion, while also exploring more subtle barriers to choice: lack of information and knowledge, provider adherence to medical models, power dynamics within relationships, and a lack of available method choice, among others. Few studies have examined the issue of choice as a whole, such that it is difficult to form an overall picture. Attention often is focused on client-provider interactions, while more personal, familial, or social issues that also bar choice are overlooked. In addition, research should also consider the factors that keep women from obtaining the sterilization services they desire, as these, too, compromise full and voluntary choice (Benagiano & Cottingham, 1997). A study among women in New York City reveals that many women who failed to obtain the sterilization they wanted also faced barriers to choice (Davidson et al., 1990).

Lastly, as demonstrated in Chapter 2, the high prevalence of sterilization is a worldwide phenomenon, yet research still tends to focus on a preconceived notion of who sterilization users are. Bumpass et al. (2000) observe that one-third of all women using sterilization in the United States are unmarried. In addition, many of these women are black. Longitudinal studies such as those of Miller, Pasta, and Shain (1990 and 1991a) on the predictors of sterilization and sterilization regret need to be extended so that samples go beyond non-Hispanic white married couples in the United States.

In addition, few studies outside of the United States have examined sterilization use beyond the developing country context. In their study of sterilization use in Scotland, Hunt and Annandale (1990) highlight this gap, stating that "recent studies of social, behavioral, and attitudinal correlates of contraceptive method use have largely been limited to studies in developing countries." Australia, Canada, the Republic of Korea, New Zealand, the United Kingdom, and the United States are but some of the developed countries in which female and even male sterilization are two of the most widely used methods. Future research should examine sterilization use in these countries as well, thereby broadening and creating a fuller understanding of the antecedents and outcomes of sterilization use.

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Chapter 6

Female Sterilization

Highlights:

- Female sterilization is one of the safest operative procedures; complications are rare and occur in fewer than 1% of all female sterilization procedures.
- Female sterilization procedures can be grouped into two broad categories: procedures for reaching the fallopian tubes (primarily abdominal approaches, such as minilaparotomy, laparoscopy, and laparotomy), and methods for occluding the fallopian tubes (mainly ligation and excision, mechanical devices such as clips or rings, and electrocoagulation).
- In the United States, the overall 10-year cumulative method failure rate following tubal sterilization is 1.85% for all occlusion methods, but the cumulative failure rate varies by method, with the lowest rates for postpartum partial salpingectomy and unipolar coagulation and the highest rates for clips and silicone bands or rings.
- About 2–6% of sterilized women in developed countries and 0.2% of sterilized women in developing countries are estimated to seek information about reversal, but the actual rate may be substantially higher. In developing countries especially, women's potential interest in restoration of fertility is probably greatly underestimated, given the inaccessibility of such services and the corresponding lack of knowledge about them.

Female sterilization is the most commonly used method of family planning; more than 180 million couples worldwide have chosen it as their contraceptive method (see Chapter 2). In this chapter, we present descriptive information about female sterilization (also referred to as tubal ligation or tubal occlusion), including different surgical approaches, data on effectiveness and complications, issues related to reversal, and an overview of innovations that might improve current procedures.

Female sterilization is a relatively simple procedure that involves permanently blocking the fallopian tubes to prevent fertilization. The procedure was first used in the early 19th century by James Blundell (Speert, 1996), and the first published report of this procedure was in 1881 (Lungren, 1881). By the mid-20th century, female sterilization had begun to gain popularity. Many modifications and new techniques have been developed since, to improve effectiveness, safety, and reversibility. Today, greatly simplified procedures performed under local anesthesia and in ambulatory settings have helped minimize the complications associated with general anesthesia (a primary risk factor for female sterilization) and have permitted the expansion of services to lower levels of the health service system in many countries. Serious complications are rare and occur in fewer than 2% of all female sterilization procedures (Pati & Cullins, 2000).

Requirements for a Safe Procedure: An Overview

Essential elements of quality sterilization services include counseling and client assessment and screening, informed consent, infection prevention, selection of appropriate procedures, safe anesthesia regimens, and postoperative care and instructions.

Counseling and client assessment and screening are important prerequisites to sterilization procedures. Since female sterilization is intended to be a permanent method of contraception, it should be provided only to women who have decided they do not want more children. Clients should be counseled about all available methods of contraception before deciding on sterilization.

Preoperative client screening is performed to ensure every client's physical and emotional fitness for the sterilization procedure, to assess client characteristics such as age and number and ages of living children (WHO, 1992), and to rule out known and identifiable physical or medical risk factors (Layde et al., 1983). Client assessment consists of taking a history (medical history and obstetric and gynecological history) and performing a physical examination (vital signs, heart, lung, abdomen, and pelvic and speculum examination).

The minimum recommended laboratory tests include tests to screen for anemia and to rule out current pregnancy. If laboratory tests are not possible, then clinical assessment for these two conditions should be performed. To minimize the chances of pregnancy at the time of a procedure, sites should have criteria for being reasonably sure that a woman is not pregnant (e.g., performing the procedure within 10 days of the last menstrual period, within seven days of an abortion, within seven days of a term delivery, or in women using reliable methods of contraception).

There are no absolute medical restrictions for female sterilization (WHO, 1992). While they are not contraindications for surgery, such problems as previous abdominal surgery, obesity, current or past history of pelvic inflammatory disease (PID), diabetes mellitus, and cardiac and lung diseases are all considered potential risk factors, as these represent conditions in which difficulties with the surgical procedure and complications can be anticipated (WHO, 1996). Hence, special precautions may have to be taken before, during, or after the surgery. Client assessment will facilitate decision making on when best to perform the surgery safely and effectively, the surgical approach to be used, the institution where it should be performed, and who should perform it.

The surgeon should verify that the client has signed an informed consent form before beginning the procedure. Although the purpose of signing the form is to document informed consent, the principal focus should be on confirming that the client has made an informed choice of tubal occlusion as a contraceptive method (see Chapter 1).

Strict adherence to good infection prevention practices at all times (before, during, and after surgery) is also crucial to the safety of the procedure. Proper aseptic technique is essential to prevent both immediate and long-term infectious morbidity and mortality. Inadequate infection prevention practices can lead to surgical-site infections, tetanus, and infections such as HIV and AIDS, hepatitis B, and hepatitis C (Grimes et al., 1982a; IPPF, 1997; Mangram et al., 1999). Shaving or clipping the hair at the operation site is no longer recommended: Studies have clearly demonstrated that shaving surgical sites significantly increases the chances of infection (Cruse & Foord, 1980; Seropian & Reynolds, 1971).

Client safety and satisfaction should be the primary considerations in the choice of the anesthesia regimen used in the performance of female sterilization procedures. The purpose of anesthesia is to ensure that the client is free from pain and discomfort during the operation. Three choices of anesthesia regimen—local, general, or regional—can be used for female sterilization procedures. Each regimen has advantages and disadvantages, as well as risks and benefits. Factors to be considered in the choice of anesthesia include the type of surgical technique, the skills of the surgeon, the availability of appropriate drugs, the safety and comfort of the client, and the ability of the surgeon to manage complications, should they occur (WFHAAVSC, 1995; WHO, 1992). The presence of a provider skilled in administering regional or general anesthesia is important if these regimens are being considered. (More detailed information about anesthesia is presented below.)

It is important for all clients and their accompanying family members to be provided with clear written and oral postoperative instructions on postoperative wound

Table 6.1. Approaches to the fallopian tubes, surgical procedures, timing of procedure, and related occlusion techniques

Approach	Surgical procedure and timing	Occlusion techniques
Abdominal	Minilaparotomy (postpartum, postabortion, or interval)	• Ligation and excision • Mechanical devices (clips, rings)
	Laparoscopy (interval only, contraindicated postpartum)	• Electrocoagulation (unipolar, bipolar) • Mechanical devices (clips, rings)
	Laparotomy (in conjunction with other surgery—e.g., cesarean section, salpingectomy, ovarian cystectomy)	• Ligation and excision • Mechanical devices (clips, rings)
Transvaginal (no longer recommended)	Colpotomy	• Ligation and excision • Mechanical devices (clips, rings)
	Culdoscopy	• Electrocoagulation (unipolar, bipolar) • Mechanical devices (clips or rings)
Transcervical* (experimental)	Hysteroscopy (interval only)	• Physical occlusion (plug) • Chemical agents (e.g., quinacrine)

* Transcervical approaches for tubal occlusion have been studied for several years, but to date none of these methods have been found to be completely safe and effective enough for implementation into routine service delivery.

care, venue for follow-up, warning signs, and appropriate advice on restriction of activities following the surgery.

Female Sterilization Procedures

The many variations in female sterilization procedures can be grouped in two broad categories: procedures for reaching the fallopian tubes (i.e., incisions and instruments), and methods for occluding the fallopian tubes.

Reaching the fallopian tubes

Three approaches provide adequate access to the fallopian tubes (Table 6.1): abdominal (such as minilaparotomy, laparoscopy, and laparotomy), transvaginal (colpotomy and culdoscopy),[1] and transcervical (blind transcervical manipulation and hysteroscopy). The transcervical approach is in large part experimental and is discussed in the Innovations section.

Many factors help to determine what sort of sterilization procedure is done. These include the timing of the sterilization in relationship to pregnancy; the need for other gynecological procedures; the woman's health characteristics (such as obesity, previous pelvic infections, and previous abdominal surgery); the training, expertise, and experience of the provider; the cost and logistics of maintaining equipment and occlusion systems, especially for laparoscopy; and the availability of back-up services (a special consideration in low-resource settings).

Timing of the procedure

The timing of the sterilization procedure is an important consideration in the choice of approach. Female sterilization procedures can be performed in conjunction with a term delivery (i.e., soon after a vaginal delivery or in conjunction with a cesarean section performed for obstetric indications), immediately following an uncomplicated first-

[1] In general, these procedures are no longer recommended, due to higher complication rates.

trimester abortion, or independent of pregnancy (during a period of time when a woman has not recently been pregnant, otherwise known as the interval period).

- *In association with term delivery.* Postpartum procedures (such as subumbilical minilaparotomy) are usually performed during the first 48 hours following vaginal delivery, or with special care 3–7 days after delivery. Sterilization procedures should not be performed between eight and 41 days postdelivery because of an increased risk of complications before the uterus has fully returned to its prepregnancy size (Blumenthal & McIntosh, 1996; Pati & Cullins, 2000; WHO, 1992). Minilaparotomy is recommended as the safest and easiest approach for postpartum sterilization because during the postpartum period the uterus is enlarged and the fallopian tubes are easily accessible. Laparoscopy is not recommended for postpartum procedures, as the postpartum enlargement of the uterus makes laparoscopic surgery difficult and injury likely (WHO, 1992). Sterilization can also be accomplished by ligation and excision of a portion of the fallopian tubes during a cesarean section. However, cesarean section should never be performed solely for the purpose of sterilization.
- *In association with abortion.* At the time of uncomplicated first-trimester abortion procedures, such procedures as laparoscopic sterilization and interval minilaparotomy can be performed (WHO, 1992).
- *Not associated with pregnancy.* Interval sterilization is performed at six or more weeks after delivery (i.e., after the uterus has fully involuted) or at any other time not associated with a pregnancy. Acceptable approaches include minilaparotomy, laparoscopy, or laparotomy (Stewart & Carignan, 1998).

Abdominal approaches

Minilaparotomy and laparoscopy are the two most commonly used procedures for interval sterilization worldwide (Speroff & Darney, 1996). Subumbilical minilaparotomy is the most commonly used procedure for postpartum sterilization.

- *Minilaparotomy.* Often referred to as minilap, minilaparotomy is defined as a laparotomy (or abdominal entry) with an incision less than 5 cm in size. The incision is located over the pubic bone during an interval procedure and under the umbilicus for a postpartum procedure. The abdomen is opened in layers, with care being taken to avoid injury to underlying structures such as the uterus, bowel, or bladder. Tubal occlusion is generally performed under local anesthesia, with or without sedation. It is also usually conducted as an ambulatory service, meaning that the client can go home shortly after the procedure. The small size of the incision, the refinement of the surgical technique, and the use of local anesthesia have contributed to the establishment of outpatient minilaparotomy services and to increased access for women desiring interval procedures.

Minilaparotomy has several advantages: First, it can be used for both interval and postpartum procedures under local anesthesia. In addition, under local anesthesia, minilaparotomy can be provided by nonspecialized doctors or by appropriately trained and supervised nurse-midwives working in modestly equipped facilities, where general or regional anesthesia usually is not available (Dusitsin & Satyapan, 1984; Kanchanasinith et al., 1990).

Furthermore, minilaparotomy requires only basic laparotomy instruments. Two additional instruments are also recommended for interval procedures—the uterine elevator or manipulator and the tubal hook, which makes locating and reaching the tubes easier. These are not used during postpartum procedures, as the uterus is enlarged and access to the fallopian tubes is enhanced by the fallopian tube's proximity to the abdominal wall.

Finally, minilaparotomy with local anesthesia is appropriate for carefully selected clients for whom surgery is not contraindicated and for whom local anesthesia with light sedation is sufficient. Postpartum minilaparotomy is a safe and effective procedure that does not increase hospitalization time and that allows women access to female steriliza-

tion during their delivery-related hospitalization (Chi, Gates, & Thapa, 1992; WHO, 1982a; WHO, 1992).

• *Laparoscopy.* A laparoscope consists of a small telescope combined with a light source, and it allows the provider to visualize the pelvic contents and identify the fallopian tubes. The telescope and equipment for tubal occlusion are inserted into the abdominal cavity through an incision underneath the umbilicus. Only one incision is required with laparoscopes that are designed with the operating mechanism for tubal occlusion incorporated directly into the scope (e.g., the Laparocator®). Other laparoscopes require an additional puncture for inserting the operating instrument (Berek, Adashi, & Hillard, 1996).

Laparoscopy can be performed satisfactorily under general, regional, or local anesthesia with light sedation. The equipment needed to perform laparoscopy includes a trocar and a scope, a gas source, a light source, an insufflation needle (to fill the abdomen with air and create room to see and operate), a uterine elevator (similar to that used with minilaparotomy), and an occlusion device—either a clip or ring applicator, or a bipolar coagulator.

Laparoscopy can be safely performed immediately after an uncomplicated first-trimester abortion or at any time unassociated with pregnancy (Coddington, 1999). It should not be performed immediately postpartum both because the risk of injury to the enlarged postpartum uterus is increased and because visibility and access to the fallopian tubes are limited.

In some locations (e.g., in Nepal), use of laparoscopy has significantly increased the availability of sterilization services. The equipment is expensive to buy and maintain, however, and laparoscopy requires a higher level of training to perform than does minilaparotomy. The risk of major complications is also higher with laparoscopy than with minilaparotomy (Liskin et al., 1985; Pati & Cullins, 2000; Ross, Hong, & Huber, 1985). Open laparoscopy was introduced in 1971 to reduce the risk of blind entry into the abdomen. This method has not gained wide acceptance, however. Many practitioners consider it to be more cumbersome and time-consuming than the use of conventional instruments and techniques (Peterson et al., 1993). Furthermore, studies have failed to show consistently lower complication rates for open laparoscopy than for conventional approaches (Levy et al., 1994).

• *Laparotomy.* Laparotomy is defined as abdominal entry through an incision greater than 5 cm and is performed under general or regional anesthesia. It is associated with more complications and a longer recovery time than either minilaparotomy or laparoscopy. Laparotomies are not usually outpatient procedures.

Laparotomy is not recommended for the sole purpose of female sterilization. Typically, sterilization may be done when laparotomy is being performed for other indications—most commonly, at the time of caesarean section for obstetric indications, or when salpingectomy is being performed concurrently with the management of an ectopic pregnancy or ovarian cystectomy. Occasionally, a minilaparotomy incision will not provide adequate exposure, as in the case of obesity or abdominal or pelvic adhesions, and a laparotomy incision will be needed.

Transvaginal approaches

Access to the fallopian tubes through the vagina is gained through a small incision below the cervix, in the posterior vaginal wall, either by direct visualization (colpotomy) or with a specially designed scope (culdoscope). Female sterilization by the transvaginal approach is used infrequently, because of higher infection rates and greater technical difficulties in accessing the fallopian tubes (Akhter, 1973; Gupta et al., 1980; WHO, 1982c). Moreover, use of the transvaginal approach is associated with increased complication rates (2–26%) (Gupta et al., 1980; Miesfeld, Giarratano, & Moyers, 1980; WHO, 1982b). Therefore, it is not recommended for tubal sterilization (RCOG, 1999; WHO, 1992).

Occluding the fallopian tubes

There are three types of occlusion procedures (Table 6.1): ligation and excision, use of mechanical devices (such as clips or rings), and electrocoagulation (the burning of the fallopian tube).

Ligation and excision methods

Ligation involves tying each fallopian tube with suture material and cutting it. Ligation and excision techniques also include removing a section of the tube. These methods, also called partial salpingectomy, are used with minilaparotomy (interval or postpartum), laparotomy, and colpotomy. They cannot be used during laparoscopy without highly specialized techniques and equipment.

The most commonly used methods are the Pomeroy and Parkland techniques (Figure 6.1). The Pomeroy technique entails identifying the fallopian tube, tying off a 2-cm loop of the tube's midportion, and cutting away the tube above the tie. Absorbable suture is used for this procedure, so the stumps of the tube will separate when the suture reabsorbs (Peterson, Pollack, & Warshaw, 1997b). In the Parkland method, the tube is tied in two places and the piece in between is cut away, leading to the immediate separation of the tubal stumps (Peterson et al., 1997b).

These techniques are highly effective, have low complication rates, are inexpensive, and do not require a specialist surgeon. They are preferred over the Uchida and Irving techniques (which are technically difficult and take longer to perform) and over fimbriectomy, or the Kroener technique (which has a higher rate of complications and failure) (Metz, 1978).

Mechanical devices

The surgeon can apply mechanical occlusion devices externally to the fallopian tube to block the tube without having to actually remove a segment. These methods are usually used in conjunction with laparoscopy, though they can also be applied directly to the fallopian tubes during interval sterilization using laparotomy or minilaparotomy (RCOG, 1999). Such mechanical devices save time and minimize tubal damage, and in theory make reversal easier. Mechanical methods require devices and applicators specific to sterilization procedures.

Two groups of mechanical occlusion devices are commonly used: silastic rings or bands, and clips (Figure 6.1). To apply silastic bands (the Falope ring or Yoon ring), the surgeon must use a special applicator to stretch a small round elastic band over a loop of the fallopian tube. The clip (the Filshie clip or the Hulka clip), also applied with a specially designed applicator, compresses a narrow segment of the fallopian tube (Soderstrom, 1998).

Electrical methods

Cautery, or burning a segment of the fallopian tube, can be used with laparoscopy and a bipolar coagulation set-up to occlude the tubes (Figure 6.1). Bipolar current has replaced unipolar electrocoagulation to reduce the risk of thermal injuries. However, the shift to bipolar electrocoagulation has not resulted in a corresponding reduction of internal injuries. Many injuries attributed to unipolar electrocoagulation may have been caused by trauma from such instruments as the verres needle, trocar, penetrating forceps, or knife (Pati & Cullins, 2000). Electrical methods require special equipment and supplies not normally found in places performing basic surgery.

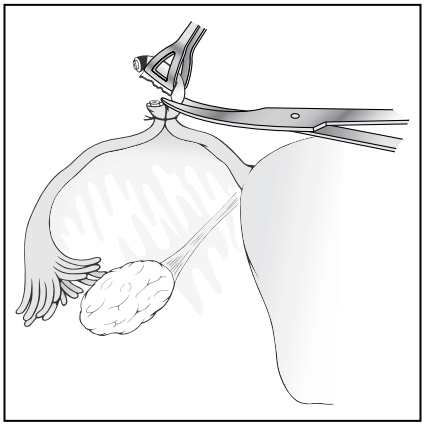
Other procedures resulting in sterilization

In addition to the tubal occlusion procedures described above, several other procedures—which are performed for purposes other than sterilization—may or do result in sterility. None of these procedures should be used solely for the purpose of sterilization.

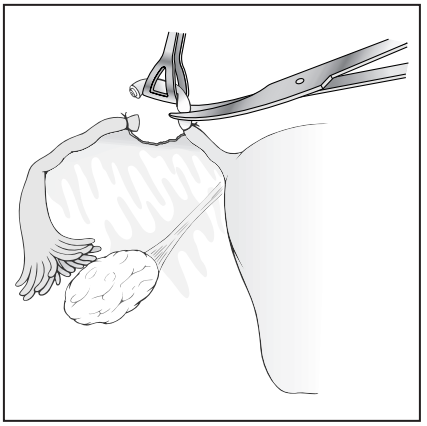
Figure 6.1. Selected methods for occluding the fallopian tubes

Ligation and excision

Pomeroy technique

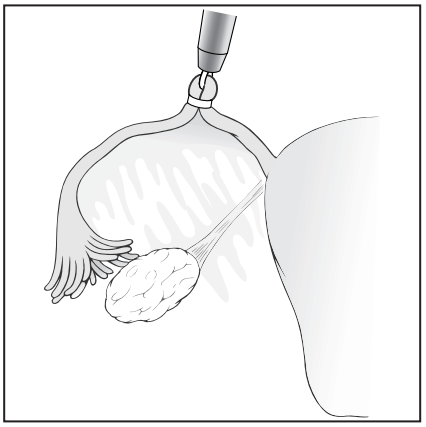


Parkland technique

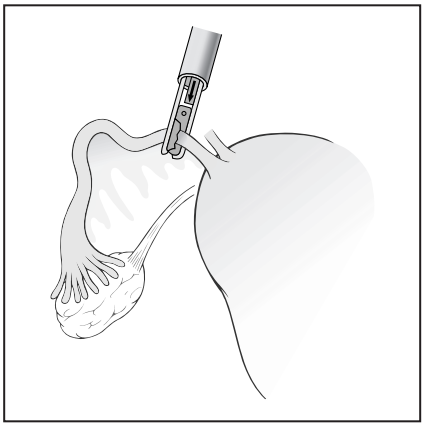


Mechanical devices

Falope ring

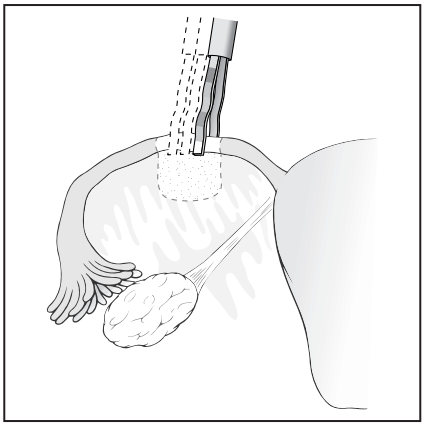


Filshie clip



Electrical method

Bipolar electrocoagulation



Factors in the Successful Use of Local Anesthesia in Sterilization Procedures

- **Preparation and screening of the client.** It is essential that the client understands what will happen during the procedure and that she is in agreement with it. Providing information beforehand about the steps of the procedure and what to expect can help to relieve clients' anxiety or can help clinicians identify particularly anxious clients. Preparation also alerts the client to what is expected from her in terms of communicating her needs and level of comfort.
- **Good communication with the client throughout the operation.** Continuous, open communication between the surgical staff and the client facilitates reassurance and relaxation for the client and increases the surgical staff's awareness of her overall comfort and well-being.
- **Timing and patience.** Local anesthesia can take several minutes to take effect. Premedications, if given orally or by injection, also need time to act.
- **Gentleness and efficiency.** Rough handling and prolonged manipulation of tissues increase client discomfort and the need for anesthesia.
- **Attentiveness and flexibility.** The surgical team must be aware of the possible need to change the anesthesia regimen and be willing and able to do so when a client experiences significant discomfort or when the surgical time is prolonged by difficulties in reaching the tubes.
- **Emergency preparedness.** As for all anesthetic regimens, the medications, equipment, knowledge, and skills to manage anesthetic complications should be available at all sites.

Source: WHO, 1992.

Common examples include hysterectomy, a major surgical procedure that involves removal of the uterus; endometrial ablative techniques, which use electrocoagulation or laser via a hysteroscope to destroy the lining of the uterus, resulting in sterility; and removal or irradiation of both ovaries, which is occasionally performed to manage malignancy (Neuwirth, 1995).

Safe Anesthesia Regimens

The goals of anesthesia are to minimize the client's psychological and emotional distress and trauma, free her from pain and discomfort, and minimize her surgical risk. Factors to be considered in the choice of anesthesia include the type of surgical technique, the skills of the surgeon, the availability of appropriate drugs, the safety and comfort of the client, and the ability of the surgeon to manage complications should they occur (WFHAAVSC, 1995; WHO, 1992). Three broad categories of anesthesia are commonly used in female sterilization: local, general, and regional.

Local anesthesia

The most commonly used regimen worldwide, local anesthesia eliminates pain at the incision site and surrounding tissues, with or without mild, systemic analgesia (diminishment of pain), so the client is awake, comfortable, responsive, and cooperative during the procedure and recovers rapidly. Additional advantages include a decreased risk of anesthesia-related complications, low cost, and ease of administration. The risks associated with local anesthesia are low and are primarily the extremely rare risk of allergic reaction to the agent or overdose generally associated with poor infiltration technique (i.e., intravascular injection).

With local anesthesia, clinicians generally need additional training to learn more gentle surgical technique and better client communication skills. This is because surgeons generally are trained to operate on clients under general anesthesia, and thus must learn how to communicate with a client who is awake during the procedure. Factors that improve the successful use of local anesthesia in sterilization procedures include preparation and screening of the client, communication with the client, timing and patience, gentleness and efficiency, attentiveness and flexibility, and emergency preparedness (see at left).

General anesthesia

General anesthesia provides unconscious sedation with amnesia, relaxation, and complete absence of pain, so the surgeon can operate on a quiet and relaxed client. The method usually requires a skilled anesthetist and special equipment for proper administration. Recovery time is prolonged, and the risk of anesthesia-related complications is higher than for local or regional anesthetic regimens (see below), regardless of the skill of the anesthetist. Because of the increased risk associated with general anesthesia, local anesthesia is usually preferred.

Occasionally, in the case of a complication or unexpected difficulty with a client who was given local anesthesia, it is necessary to administer general anesthesia to manage the problem. Ketamine can be used to induce general anesthesia rapidly, but should be administered after premedication with atropine and with diazepam or promethazine, to minimize the risk of psychotropic reactions. These medications should be administered by personnel trained in their use.

Regional anesthesia

Regional (spinal or epidural) anesthesia (through administration of an anesthetic injection into the subarachnoid or peridural space of the spine) provides complete anesthesia to the desired operative level in a conscious client. Regional anesthesia requires a skilled

anesthetist and additional supplies; as a result, it is a more costly and more complicated procedure. Recovery time is prolonged compared with local anesthesia, and the risk of anesthesia-related complications is greater. Because of these disadvantages, local anesthesia is usually preferred.

Successful use of anesthesia

Using safe, standardized regimens

There has been clear progress in making anesthesia regimens for sterilization safe, simple, and accessible. Anesthetic complications should continue to diminish as providers become more familiar with standard regimens, as medications with better safety profiles are introduced, and as greater attention is given to client monitoring. Though regimens vary from location to location and change over time, depending on differences in supplies, facilities, introduction of new anesthetic agents, and techniques, the guiding principles remain: a safe and simple-to-use regimen, good client communication, and careful monitoring of the client.

Monitoring

For any anesthetic regimen, careful and frequent monitoring of the client includes an assessment of her vital signs, level of consciousness, comfort, and sense of well-being. When performed before, during, and after the procedure, such monitoring allows the surgical staff to detect possible complications related either to the anesthesia or to the surgery early and to assess the adequacy of pain relief.

Detecting and managing complications promptly

Anesthetic complications are commonly caused by overdosage, rapid or improper administration of drugs, and inadequate monitoring (Bhatt, 1991). Successful management of anesthesia-related complications depends on early identification of a problem and an immediate and correct response. Equipment, medications, and supplies for managing emergencies should be readily available. Staff should be familiar with and should practice effective emergency management, including basic resuscitation and support (establishing an open airway, assisting breathing and supplementing oxygenation, and supporting or reestablishing circulation).

Postoperative Care and Instructions

Careful postoperative monitoring is the most effective way to detect immediate postoperative complications, such as bleeding. It is important for all clients and their accompanying family members to be given clear written and oral postoperative instructions on postoperative wound care, information on where to go for follow-up, a description of warning signs, and appropriate advice on restricting activities after surgery, so that delayed complications can be prevented or quickly detected and managed.

Effectiveness

In general, if female sterilization is performed correctly, it is one of the most effective contraceptive methods available. The risk of pregnancy following female sterilization is lower than the risk associated with other contraceptive methods during the first year of use (Stewart & Carignan, 1998).

Any pregnancy occurring after the procedure, be it in utero or ectopic, is a failure (see the Complications section for a discussion of ectopic pregnancy). Pregnancies that began before the time of tubal occlusion (known as luteal-phase pregnancies) but that are not recognized until after the procedure arise from problems with client screening

Preventing Failure following Female Sterilization

There are five common causes of sterilization failure:

- An undetected luteal-phase pregnancy that was present at the time of the sterilization
- Surgical "occlusion" of a structure other than the fallopian tube (most often, the round ligament)
- Incomplete or inadequate occlusion of the tube
- Misplacement of the mechanical device
- Development of a tuboperitoneal fistula

Given these common causes of failure, two methods can be used to prevent failures:

- The incidence of undetected pregnancy can be decreased by scheduling the procedure within the first 7–10 days of the start of a menstrual cycle.
- The fallopian tube can be identified properly by tracing it to the fimbrial end prior to occlusion.

Meticulous attention should be paid to technique, whichever method is used.

Source: Soderstrom, 1985; WHO, 1992.

prior to the procedure (see at left). The estimated rate of luteal-phase pregnancies is 2–3 per 1,000 sterilization procedures (Peterson et al., 1997b). Ruminjo and Lynam (1997), in their 15-year review of 12,000 Kenyan clients who had minilaparotomy under local anesthesia, reported that luteal-phase pregnancy accounted for 50% of all failures following female sterilization. (The total failure rates reported in the study were 0.4% in the first year and 0.1% in the second year.)

Technical errors in the performance of the surgery and failures in the occlusive methods used result in pregnancies occurring after the procedure and reflect true failures of the sterilization procedure (Chi, Gardner, & Laufe, 1979; Liskin et al., 1985; Peterson et al., 1996; Peterson et al., 1999). Until recently, reported failure rates following female sterilization ranged from 0.2% to 0.9% but were based on data obtained after 1–2 years of poststerilization follow-up (Trussell et al., 1990). Koetsawang et al. (1990) and Peterson et al. (1996) have shown that sterilization failures (both in utero and ectopic pregnancies) can occur beyond the first few years following the procedure.

The Collaborative Review of Sterilization (CREST), a large prospective study conducted in 16 teaching hospitals in the United States between 1978 and 1986, reported that the overall 10-year cumulative failure rate following sterilization is 1.85% for all occlusion methods (Peterson et al., 1996). (All reported pregnancies were due to method failure only.) The cumulative failure rate varied with the occlusive method used, with the lowest rates for postpartum partial salpingectomy and unipolar coagulation (7.5 per 1,000 procedures each) and the highest rates for Hulka clips (36.5 per 1,000 procedures) and silicone bands or rings (17.7 per 1,000). The risk of failure correlates with the amount of tube destroyed. That study also showed that for all methods except interval partial salpingectomy, the 10-year pregnancy rate was higher for women younger than 28 at the time of sterilization than for women older than 34 (see Table 6.2).

In 1999, Peterson et al. reanalyzed the CREST data on pregnancy rates following bipolar sterilization. According to the reanalysis, the five-year cumulative failure rate dropped from 1.95% in the group that had female sterilization between 1978 and 1982 to 0.63% for procedures performed between 1985 and 1987. They concluded that the reduction in the cumulative failure rate of bipolar coagulation was probably related to better attention to technique and to the level of destruction of the fallopian tube.

Overall, the CREST study findings cannot necessarily be generalized to settings beyond the teaching hospitals from which the data were gathered. Limitations include the unknown qualifications of the physicians who performed the procedures (i.e., they may have been inexperienced residents) and the lack of a representative sample for each of the occlusive methods studied (Pati, Carignan, & Pollack, 1998).

In China, the 1988 National Demographic and Family Planning Survey, which used a nationally representative sample of more than 2 million respondents, found steriliza-

Table 6.2. Among women undergoing female sterilization, 10-year cumulative probability of pregnancy per 1,000 procedures (and 95% confidence intervals), by age at sterilization, according to method of occlusion

Occlusion method	No. of women	Age at sterilization			
		18–44	18–27	28–33	34–44
Postpartum partial salpingectomy	1,637	7.5 (2.7–12.3)	11.4 (1.6–21.1)	5.6 (0.0–11.9)	3.8 (0.0–11.4)
Unipolar electrocoagulation	1,432	7.5 (1.1–13.9)	3.7 (0.0–11.1)	15.6 (0.0–31.4)	1.8 (0.0–5.3)
Silicone (silastic) band or Yoon ring	3,329	17.7 (10.1–25.3)	33.2 (10.6–55.9)	21.1 (6.4–35.9)	4.5 (0.6–8.4)
Interval partial salpingectomy	425	20.1 (4.7–35.6)	9.7 (0.0–28.6)	33.5 (0.0–74.3)	18.7 (0.0–39.6)
Hulka clip application	1,595	36.5 (25.3–47.7)	52.1 (31.0–73.3)	31.3 (15.1–47.5)	18.2 (0.0–36.4)
Bipolar electrocoagulation	2,267	24.8 (16.2–33.3)	54.3 (28.3–80.4)	21.3 (9.6–33.0)	6.3 (0.1–12.5)

Source: Peterson et al., 1996.

tion failure rates that were comparable to those seen in U.S. studies. The one-year cumulative failure rate was 0.5 failures per 100 sterilized cases, the three- and five-year rates were 1.2 and 1.4 per 100, respectively, and the rate 10 years after female sterilization was 1.7 per 100. The survey identified 125,483 female sterilization cases, including 2,989 performed with nonsurgical methods (i.e., instillation of phenol-atabrine paste, or PAP). Analysis of the 10-year cumulative female sterilization failure rate by level of hospital showed that failure rates at lower-level hospitals in China were similar to those at higher-level facilities. This contrasted with a finding that male sterilization failure rates were significantly higher in the lower-level facilities (Chen, 1999).

Complications

Female sterilization is one of the safest operative procedures. Complications are rare and occur in fewer than 1% of all female sterilization procedures (Stewart & Carignan, 1998). The World Health Organization (WHO) definition for complications following female sterilization is: "problems directly related to the surgery or the anesthesia that occur within 42 days and that require intervention and management beyond what would be normally provided." Examples include infection, bleeding, unintended injury to internal organs, and depressed respiration or blood pressure due to anesthesia (WHO, 1992).

Complications can be categorized as minor or major. Major complications require unintended hospitalization or surgery, blood transfusion, or treatment of life-threatening events or events that result in death (WHO, 1992). Minor complications are those that require intervention and management beyond what would normally be provided, but do not progress to any of the five events mentioned above (WFHAAVSC, 1995; WHO, 1992).

Complication rates vary by the quality of care provided at the service site, the expertise of the surgeon, the approach and occlusion technique used for sterilization, the type of anesthesia, the timing of the procedure, and the characteristics of the client (e.g., obese clients or those with a history of pelvic infections). The accuracy and completeness of reporting also affect reported complication rates.

Intraoperative and early postoperative complications

Most intraoperative and early postoperative complications can be prevented or reduced by meticulously screening clients, using local anesthesia, avoiding heavy sedation, monitoring clients both intraoperatively and postoperatively, adhering to infection prevention practices, and using good surgical technique. Early recognition and prompt management can help reduce the severity of complications (Bangladesh FPCST, 1990; WHO, 1992).

Minilaparotomy complications

During minilaparotomy, minor intraoperative difficulties in entering the abdomen, in visualizing the fallopian tube, and in grasping the tube have been reported; obesity is cited as the main reason for these difficulties (Githiari & Kibanga, 1989). Technical failures during minilaparotomy may require abandoning the procedure or changing the approach (Ruminjo & Ngugi, 1993). Other minor complications include wound infection and self-limited hematoma.

Major intraoperative complications associated with minilaparotomy are uncommon (occurring in fewer than 1% of procedures). Such complications include bowel injury, bladder injury, uterine perforation, unintended intraoperative surgery (due to lacerations of the tube or ligament), and excessive intraperitoneal bleeding (Chi, Potts, & Wilkens, 1986; WHO, 1992).

Postpartum minilaparotomy is associated with a major complication rate of 0.3% and a minor complication rate of 4.2%, as reported by the 1982 WHO Task Force study (WHO, 1982a). The main complications reported included abandonment of the surgery, bleeding, injuries to internal organs, and anesthetic complications. The study also

showed that minor complications consisted of the need to enlarge the incision, blood loss of less than 50 ml (but not requiring additional treatment), local infections, and urinary tract infections.

Laparoscopy complications

Laparoscopy carries a greater risk of bowel or vascular injury than does minilaparotomy, while minilaparotomy is associated with a greater risk of bladder injury, uterine perforation, and wound infection (WHO, 1982b). The American Association of Gynecologic Laparoscopists has reported major complication rates (problems requiring laparotomy) for sterilization of 1.4 per 1,000 procedures (Peterson et al., 1993). A Finnish study reported national rates of about 0.5 per 1,000 procedures (Harkki-Siren, Sjoberg, & Kurki, 1999).

Anesthesia complications

In the United States, anesthesia complications are the leading cause of mortality associated with contraceptive sterilization (ACOG, 1996). The WHO Task Force (1982b) reported major morbidity such as prolonged apnea and cardiac arrest (both responding to resuscitation) among women who had minilaparotomy under general anesthesia. However, complications of anesthesia, which historically have contributed significantly to sterilization-related morbidity and mortality, have declined significantly since 1985, in both developed and developing countries (ACOG, 1996; Akhter, 1973; Bhatt, 1991). This improvement has been achieved as a result of the shift away from general and regional anesthesia toward regimens of local anesthesia, with or without light sedation, in conjunction with better training and standardization of the dosages used (Bhatt, 1991; Bishop & Nelms, 1930). The majority of tubal ligations worldwide are performed under local anesthesia (Pati & Cullins, 2000).

In a multicountry longitudinal study of sterilization-associated mortality conducted by EngenderHealth (Khairullah, Huber, & Gonzales, 1992), anesthesia-related mortality was decreased by more than half between the periods 1973–1981 and 1982–1988, from 2.5 deaths to one death per 100,000 cases. Numerous studies and widespread use of local anesthesia with or without sedation have confirmed its safety, efficacy, high client satisfaction, and cost-effectiveness, for laparoscopy and minilaparotomy as well as vasectomy (Akhter, 1973; Chi et al., 1995; Chi, Petta, & McPheeters, 1991; Chi et al., 1987; de Villiers & Morkel, 1987; Duffy & diZerega, 1994; Grimes et al., 1982b).

Postoperative complications

Postoperative complications appear after the woman has left the hospital. It is difficult to determine how many postoperative female sterilization complications occur. In many countries, clients do not return for routine follow-up examinations, and analysis of information from client records is a challenge. In two poststerilization follow-up studies conducted in Kenya, researchers found that more than 97% of clients did not develop any complications following tubal sterilization (Githiari & Kibanga, 1989; Ruminjo & Lynam, 1997). Minor wound hematoma (0.3–2%) and wound infection (0.9–6%) are the most common minor complications (Githiari & Kibanga, 1989; Ruminjo & Lynam, 1997; Ruminjo & Ngugi, 1993; WHO, 1982a; WHO, 1982b). None of these studies have reported opening of the incision following minilaparotomy (Chi, Potts, & Wilkens, 1986; Githiari & Kibanga, 1989; Ruminjo & Lynam, 1997; Ruminjo & Ngugi, 1993; WHO, 1982a; WHO, 1982b; WHO, 1982c).

Long-Term Effects

Ectopic pregnancy

Because the overall risk of sterilization failure is low, the absolute risk of ectopic pregnancy is lower among sterilized women than among nonsterilized women (Franks et al.,

1990; Peterson et al., 1997a). When a pregnancy does occur after sterilization, however, there is a high probability that it will be ectopic. Data from the CREST study, which was conducted in the United States, reported a 10-year cumulative probability of ectopic pregnancy of less than 1% (7.3 ectopic pregnancies per 1,000 procedures) for all methods of female sterilization combined (Peterson et al., 1997a). An important finding from this study is that ectopic pregnancy may occur 10 or more years after the sterilization. This study also reported an association between ectopic pregnancy and the tubal occlusion method used (see Table 6.3). The highest 10-year cumulative probability of ectopic pregnancy occurred among women who had undergone bipolar electrocoagulation (17.1 ectopic pregnancies per 1,000 procedures), while the lowest probability was found among women who had undergone postpartum partial salpingectomy (1.5 per 1,000 procedures). Other investigators have reported a lower risk associated with postpartum partial salpingectomy as well (Holt et al., 1991). Additionally, women younger than 30 have a greater probability of ectopic pregnancy, probably because of their higher fecundity (Peterson et al., 1997a).

Key Points about the Long-Term Effects of Female Sterilization

- The absolute risk of ectopic pregnancy is lower among sterilized women than among other women, but when a pregnancy occurs, it is likely to be ectopic.
- The latest evidence questions the existence of poststerilization syndrome.
- The likelihood that a woman will have a hysterectomy at some time following sterilization cannot be explained based on biological facts.
- Sterilization has been shown to have a protective effect against ovarian cancer.
- Female sterilization does not protect users against HIV or sexually transmitted infections.

Poststerilization syndrome

Alterations in menstrual cycle flow or length or in menstrual pain have been attributed to female sterilization and are referred to as poststerilization syndrome. However, because experts do not agree regarding the definition of poststerilization syndrome, it has been difficult to study (Peterson et al., 2000). Many early studies failed to control appropriately for factors that can affect menstrual cycles, such as previous contraceptive use and previous menstrual dysfunction. In the United States, where 30% of women who undergo sterilization have used oral contraceptives prior to surgery, changes in the menstrual cycle can be expected once oral contraceptive use ends. Women who experienced increased menstrual bleeding and pain prior to sterilization are likely to report these same problems poststerilization (DeStefano et al., 1985; Fortney, Cole, & Kennedy, 1983).

In a recent publication of data from the CREST study, a sample of women who had a sterilization and a sample of women whose partners had a vasectomy were followed for five years in a multicenter prospective cohort study. All women were asked the same six questions about their menstrual cycles during annual follow-up telephone interviews. Women who had a sterilization were no more likely than those who had not undergone sterilization to report changes in their menstrual cycles (Peterson et al., 2000). These new data offer additional evidence to argue against the existence of poststerilization syndrome.

Table 6.3. Number of women who had undergone tubal sterilization, number who experienced an ectopic pregnancy within 10 years postpartum, and cumulative probability of an ectopic pregnancy per 1,000 sterilization procedures, by tubal occlusion method, United States

Occlusion method	No. of women	No. of ectopic pregnancies at 10 years poststerilization	Cumulative probability per 1,000
Bipolar electrocoagulation	2,267	24	17.1
Interval partial salpingectomy	425	3	7.5
Silicone (silastic) band	3,329	10	7.3
Postpartum partial salpingectomy	1,637	2	1.5
Unipolar electrocoagulation	1,432	1	1.8
Spring clip application	1,595	7	8.5

Source: Adapted from Peterson et al., 1997a.

Hysterectomy and female sterilization

Evidence provided by large, long-term, controlled studies supports the view that in the United States, at least, hysterectomy rates are higher among sterilized women than among nonsterilized women (Goldhaber et al., 1993; Hillis et al., 1998; Stergachis et al., 1990). This increased rate of hysterectomy, not seen in other areas of world, is especially evident among women who were younger than 30 at the time of sterilization (Cohen, 1987; Goldhaber et al., 1993). The various methods of tubal occlusion have also shown increased risks of hysterectomy (Goldhaber et al., 1993; Hillis et al., 1998). Hillis et al. (1997), in their long-term study (14 years), reported that the risk for future hysterectomy was increased when certain gynecological conditions existed prior to tubal sterilization. These conditions included a history of heavy menstrual flow, severe menstrual pain, more than seven days of bleeding during the menstrual cycle, PID, ovarian cysts, endometriosis, and uterine fibroids. Taking this into consideration, it is important to note that Hillis et al. (1997) found a greater than 80% cumulative probability of not having a hysterectomy 14 years poststerilization.

No biological explanation for the increased risk of hysterectomy has been identified, and nonbiological explanations are more likely. One major nonbiological reason may be that both a physician and a client have a lower threshold for choosing a definitive surgical intervention (such as hysterectomy) when the woman has previously been sterilized (Pati & Cullins, 2000).

Ovarian cancer

Available evidence consistently shows a decreased risk for ovarian cancer among women who have had tubal ligation (Greene et al., 1997; Hankinson et al., 1993; Irwin et al., 1991; Miracle-McMahill et al., 1997). The etiology of ovarian cancer is not known at present. There are two hypothesized reasons for the protective effect. The first is the disruption of the fallopian tube as a consequence of surgical sterilization, thus minimizing the chance that the ovaries will be exposed to potential carcinogens that travel from the vagina into the uterus and fallopian tubes. The second is the incidental screening of gross ovarian pathology during the sterilization procedure, which can lead to diagnosis and management of the cancer. Whatever the cause, the protective effect is present in the first 15 years following sterilization; the extent of protection from ovarian cancer beyond 15 years is unknown, because few women have been followed for more than 15 years (Pati & Cullins, 2000).

PID and sexually transmitted infections

Sterilization does not protect against HIV and other sexually transmitted infections (STIs). Women who are at risk for these infections need to be counseled about the use of condoms. Some studies report that PID is less common in women who are sterilized than in those who are not; however, protection is not absolute, since there are a few reports of PID in women who have had a sterilization (immediately following the procedure and in later years) (Levgur & Duvivier, 2000; Pati & Cullins, 2000).

Mortality

Overall, mortality related to female sterilization is rare. By comparison, estimates of maternal mortality in developing countries are much higher, ranging from 300 to 1,700 maternal deaths per 100,000 live births (WHO and UNICEF, 1996). The risk of death from using any method of contraception, including sterilization, is much lower than the risk from pregnancy.

Deaths following female sterilization can be “associated with” or “attributable to” sterilization (WFHAAVSC, 1995):

- A death is **attributable** to sterilization when it occurs within 42 days of the surgery and results from a chain of events initiated by the operation or

anesthesia or from aggravation of an unrelated condition by the physiological or pharmacological effects of the operation or anesthesia.

- A death is **associated** with sterilization when it occurs within 42 days of the surgery but is not causally related to the operation, the anesthesia, their complications, or their management.

In a survey of the American Association of Gynecologic Laparoscopists, only one death was reported among almost 23,000 laparoscopic procedures (Hulka et al., 1995), making mortality attributable to laparoscopy a rare event. According to Escobedo et al. (1989), case-fatality rate estimates for the United States, based on 1979–1980 records and considering only deaths directly attributed to female sterilization (both minilaparotomy and laparoscopic sterilization), were between one and two per 100,000 procedures. The case-fatality estimate in the United States is around nine per 100,000 tubal sterilizations when all deaths *associated* with tubal sterilization are considered (Escobedo et al., 1989). Within recent memory, mortality associated with hysterectomy (the second most common operation, after cesarean section) has been about 0.2%, or two per 1,000 cases, in the United States (Peterson et al., 1997b; Thompson & Warshaw, 1997).

Early reports on mortality rates for minilaparotomy vary from six deaths per 100,000 sterilized women between 1973 and 1988 worldwide (Khairullah, Huber, & Gonzales, 1992) to 19 per 100,000 sterilized women between 1979 and 1980 in Bangladesh (Grimes et al., 1982b). However, 1997 data on female sterilization–related mortality (for both minilaparotomy and laparoscopy) reported by the Family Planning Clinical Supervision Team of Bangladesh shows a mortality rate of nearly three deaths per 100,000 in 1996 (one death in 37,024 procedures) and no reported mortality in 1997 (in 47,282 sterilization procedures) (Bangladesh FPCST, 1998).

The most common causes of mortality reported from developing countries include peritonitis, with and without injuries to internal organs, and postoperative septicemia (Bhatt, 1991; Tewari & Rathee, 1997). Complications related to anesthesia account for significant mortality associated with female sterilization both in developed and developing countries (Grimes et al., 1982b; Intaraprasert, Taneepanichskul, & Chaturachinda, 1997; Khairullah, Huber, & Gonzales, 1992; Peterson et al., 1983). Common causes of death from female sterilization are respiratory and cardiovascular complications related to anesthesia, infections (including tetanus), surgical errors (such as injuries to internal organs), excessive bleeding, and pulmonary and gas embolism (reported, though less common) (Aubert, Lubell, & Schima, 1980; Bhatt, 1991; Grimes et al., 1982b; Khairullah, Huber, & Gonzales, 1992; Tewari & Rathee, 1997).

Sterilization-attributable deaths are rare. However, many of these deaths can be prevented. Preventive measures can be adopted, however, only if data on the number of complications and the cause of death can be determined.

Regret and Sterilization Reversal

Regret

Despite clear intentions, unforeseen events—most commonly, divorce, remarriage, the death of a child, or the desire for more children—may lead a sterilized couple to regret having been sterilized and possibly to seek a reversal procedure. The prevalence of regret varies, with considerable variation among studies in definitions. Evidence from the longitudinal CREST study in the United States suggests that regret is high among women sterilized at a young age—about 20% for women younger than 30 at the time of sterilization, as opposed to 6% for women older than 30 (Hillis et al., 1999). Among women aged 30 and younger, the most commonly cited reasons are remarriage or the desire for another child, while among women older than 30 the most common reason is subsequent gynecological or menstrual problems (Hillis et al., 1999). This is true in less-developed countries as well (Pile & Harper, 1991). Long-identified risk factors for regret include young age, unstable marriage, few children, death of a child, postpartum

sterilization, or sudden decision to undergo the procedure (Henshaw & Singh, 1986; Neamatalla & Harper, 1994; Peterson et al., 1997b; Wilcox, Chu, & Peterson, 1990).

Although 2–6% of sterilized women in developed countries and 0.2% in developing countries are estimated to seek information about reversal (Marcil-Gratton et al., 1988; Ross, Ross, & van Middlekoop, 1982), the actual rate may be substantially higher. For example, in the CREST study, the 14-year cumulative probability that a woman would request information about reversal was 14% overall, and 40% if she was sterilized at ages 18–24 (Schmidt et al., 2000). In developing countries especially, this percentage probably greatly underestimates women's potential interest in restoration of fertility, given the inaccessibility of such services and the corresponding lack of knowledge about them. Variation in the prevalence of regret from country to country will vary largely as a function of the frequency of divorce and of the age and parity at which most sterilizations occur.

Regret of sterilization will continue to occur, despite providers' best efforts at comprehensive counseling, because of unanticipated changes in people's life circumstances. There are several ways to minimize the likelihood of regret. The most important and cost-effective approach is prevention, in the form of quality counseling for all prospective clients, especially those at increased risk for regret. Another is easy access to effective, well-tolerated, long-acting reversible methods for couples who are not yet clear about their decision or who wish to postpone sterilization. Some tubal occlusion techniques are more easily reversed than others, and this could be considered when the sterilization technique is chosen; however, at present, sterilization must continue to be considered a permanent procedure. (See Chapter 5 for more information about regret.)

Reversal

In reversing a tubal ligation (known as tubal reanastomosis), the severed ends of the tubes are rejoined surgically. Success depends on the type of tubal occlusion method originally used (clips cause the least damage and have the highest rate of reversal), on age at the time of reversal, and on reversal technique and surgical experience. A review of many studies reveals the chance of successful pregnancy to be roughly 50%. In actual practice (not in the hands of experts), this percentage is probably much lower. Moreover, the risk of ectopic pregnancy is increased in women who undergo tubal reanastomosis (Henry, Rinehart, & Piotrow, 1980).

Because of advances in the field of assisted reproduction, there are nonsurgical options for addressing reversal. For women ineligible for or uninterested in tubal reanastomosis, in vitro fertilization offers several advantages: It avoids major abdominal surgery, costs can be controlled by limiting the number of cycles attempted,[2] and infertility is resumed following any intended pregnancies. Either surgery or in vitro fertilization may prove to be a better option for reversal, depending on a variety of factors, including the availability of quality services and client characteristics.

Many countries offering sterilization services report that surgical reversal is available; for example, all 28 developing countries surveyed by the World Federation of Health Agencies for the Advancement of Voluntary Surgical Contraception (WFHAAVSC) in 1988 reported that reversal services were available (Pile & Harper, 1991). In reality, however, these services remain inaccessible to most people who might be interested in them. Barriers include a lack of awareness of the existence of these services, a lack of trained specialists and adequate facilities, the potential unsuitability of the client, and cost of the procedure to the client (especially as it relates to the likelihood of success). Results from the U.S. CREST study documented that, over a 14-year period following sterilization, the probability that a sterilized woman actually underwent tubal

[2] The chance of pregnancy with each cycle of in vitro fertilization is currently estimated to be about 20% in centers with good success rates (ASRM, 2002).

reanastomosis was only 1% (Schmidt et al., 2000). Many women were reluctant to pursue surgery, given the high cost and high probability of failure.

Sterilization reversal will likely continue to be inaccessible to many people, even as reversal options become more effective and, possibly, cheaper. Experts are trying to develop sterilization methods that are more easily reversed, reasonably cost-effective, and minimally invasive. These efforts have concentrated mostly on physically blocking the fallopian tubes with a plug that could be easily inserted and then removed when fertility is again desired. To date, none of these methods have shown sufficient promise to be made available anywhere on a commercial basis.

Innovations

Demand for female sterilization services is likely to continue to increase in many regions of the world (see Chapter 8). Given this continuing demand, researchers are working to identify still safer, easier, and more cost-effective techniques. Several innovative methods under development represent attempts to achieve tubal occlusion nonsurgically and to improve current surgical devices.

Nonsurgical mechanisms for occluding the tubes

Currently, a woman desiring female sterilization must undergo surgery. In an attempt to lower the costs associated with the procedure, improve the safety and accessibility of sterilization, and increase its acceptability to clients, researchers have investigated methods of female sterilization that do not require surgery and that might be able to be provided by nonphysicians. One of the possibilities being explored is occluding the tubal lumen by introducing chemical, mechanical, or thermal agents through the cervix, thus gaining direct access to the opening of the fallopian tubes inside the uterus without having to perform surgery. These occlusive methods are collectively categorized as transcervical methods. The tubal openings may be approached blind or with hysteroscopic guidance (Neuwirth, 1995); anesthesia may or may not be used. Further studies are needed to prove the safety and the efficacy of both the approach and the occlusion methods (Wilson, 1995). Presently, all transcervical methods are experimental and have undergone only limited testing for safety and efficacy. Quinacrine and silicon plugs have generated the most interest; newer on the horizon is the Essure® Device.

Silastic plugs are being investigated in Europe. With this method, liquid silicone is placed in the fallopian tubes using a hysteroscope; the gel hardens in about five minutes (Barnett, 1997). European research is also under way on methods that use water-based gel plugs and nylon or plastic threads to block the tube. To date, the problem with all of these methods is that the plugs can migrate or break (Barnett, 1997).

The Essure Device, a new permanent sterilization method under development in the United States, is a plug designed to be placed in the fallopian tubes via a hysteroscope, in an office setting, using local anesthesia. The plug consists of a 4-cm microcoil containing polyester fibers; these generate a localized tissue response in which tissue grows in and around the device, subsequently occluding the fallopian tube. Preliminary studies of tolerance and efficacy have revealed good-to-excellent client tolerance of the procedure, high client satisfaction (96% at 12 months), and a projected one-year effectiveness rate of 96%. Safety and efficacy studies are ongoing in Australia, Europe, and the United States (Carignan, 2000).

The availability of a nonsurgical method of permanent contraception that is safe, cheap, effective, and widely available would most dramatically affect access—where the procedure can be performed and who can perform it. However, these methods also pose increased potential for misuse. For example, women could be sterilized during pelvic examinations without their consent or knowledge. In this regard, the most controversial experimental method in recent years has been quinacrine.

Quinacrine was originally used orally to treat malaria. In the 1970s, the drug was formulated into pellets that can be inserted through the cervix using a device resembling an intrauterine device (IUD) inserter (Zipper, Stacchetti, & Mendel, 1975). The pellets dissolve, causing sclerosis (scarring) and subsequent occlusion of a segment of each fallopian tube. Quinacrine's appeal as a tubal occlusion method is its potential as a low-cost, easy, nonsurgical outpatient method.

Quinacrine has not been approved for general use for nonsurgical sterilization in any country because its safety and efficacy have not been adequately determined. Nevertheless, the drug has been used in many countries, including Bangladesh, Chile, China, Colombia, Costa Rica, Egypt, India, Indonesia, Iran, Pakistan, Romania, Venezuela, and Vietnam (Pine & Pollack, 2000).

The use of quinacrine as a nonsurgical method of sterilization gained widespread attention in 1993 following publication of a study involving more than 30,000 women in Vietnam who had undergone quinacrine sterilization (Hieu et al., 1993). Subsequently, several international organizations, including WHO, reviewed all available research on the use of quinacrine for sterilization to assess its safety and efficacy. A WHO consultative meeting recommended further toxicological testing of quinacrine and further follow-up of women who had received quinacrine in Vietnam (Sokal et al., 2000a).

Because of concerns about its widespread investigational use, but continued belief that the method could be a safe and effective nonsurgical method of sterilization, Family Health International (in collaboration with Vietnamese researchers) began in 1994 a series of studies designed to examine the safety and efficacy of quinacrine. Recently published preliminary findings from a long-term follow-up study of Vietnamese women who had quinacrine sterilizations reported on an interim analysis of long-term pregnancy rates and safety data, including rates of ectopic pregnancy and adverse health events (Sokal et al., 2000a; Sokal et al., 2000b). The efficacy of quinacrine (as measured by pregnancy rates after five years of use) appears to have been reasonable (6.8%) for two insertions of the drug among women aged 35 and older. The authors estimate that the five-year cumulative probability of pregnancy is 12.6 per 100 women for women receiving two insertions (Sokal et al., 2000a).

Published data on safety issues showed ectopic pregnancy rates similar to those reported in the CREST study. Findings on adverse health outcomes were difficult to interpret and therefore inconclusive on this point (Sokal et al., 2000b). Further analysis of findings from these studies will provide more answers to questions about quinacrine's safety and efficacy. In August 2001, Family Health International began one of two planned carcinogenicity studies in neonatal mice; this study is expected to take 18–24 months to complete (Sokal, 2001).

The other key remaining issue that will require attention if quinacrine is introduced in new clinical trials is to ensure that women are fully informed about the method's experimental nature, including short-term and long-term side effects.

To date, when delivered to the fallopian tubes, none of these devices or substances—silicon plugs, the Essure Device, or quinacrine—have shown consistent advantages over surgical sterilization.

New surgical techniques

Another new approach is microlaparoscopy, which utilizes a high-quality, often flexible scope as small as 1.5 mm in diameter. (The conventional rigid laparoscope is 5–15 mm in diameter.) The advantages of microlaparoscopy for the performance of sterilization are that the procedure can be performed in an office setting under local anesthesia and that the technique requires a much smaller incision than do traditional laparoscopy or minilaparotomy. Experience with microlaparoscopy is still too limited to assess the future of this approach for sterilization, however.

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Chapter 7

Male Sterilization

Highlights:

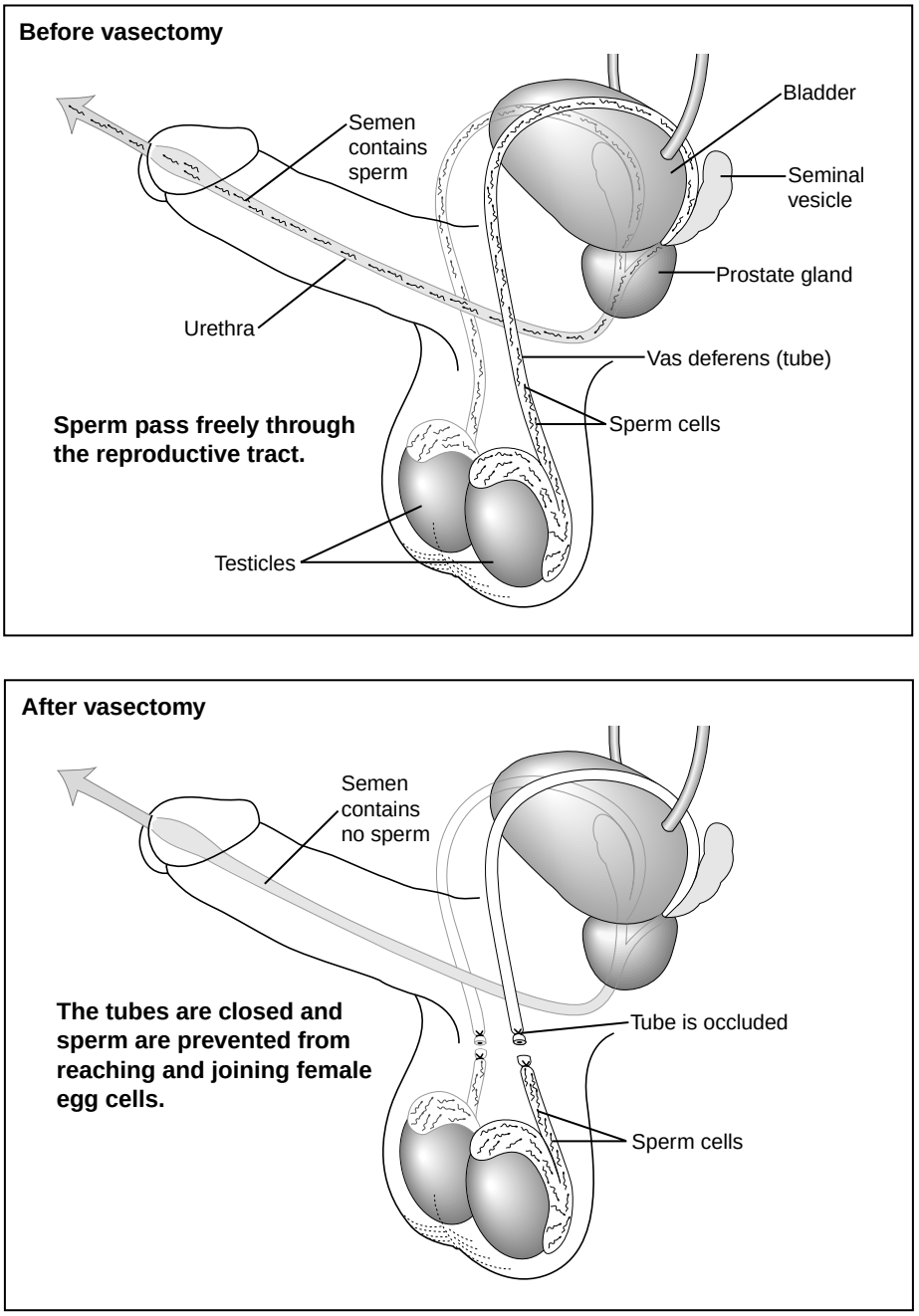
- Vasectomy is one of the safest and most effective family planning methods and is one of the few contraceptive options available for men. Failure rates are generally thought to be between two and four pregnancies per 1,000 users, although rates as high as 5% have been reported.
- Both conventional and no-scalpel vasectomies are performed almost exclusively under local anesthesia only. Sedation or regional or general anesthesia are rarely needed and unnecessarily increase the risk and the costs of the procedure.
- Compared with conventional vasectomy, no-scalpel vasectomy results in fewer complications, produces less pain during the procedure and early follow-up period, and permits couples to resume sexual activity earlier after surgery; also, the time required for the vasectomy procedure is less when skilled providers use the no-scalpel approach.
- Vasectomy does not appear to have any significant long-term negative physical or mental health effects, as well-designed epidemiological studies in men have consistently shown the procedure to be associated with no elevated risks of heart disease, testicular or prostate cancer, or immune complex disorders.

Vasectomy, a method of male sterilization, is a simple, minor surgical procedure that is performed by entering the scrotum through a small incision or puncture, locating each vas deferens (the tube that carries the sperm from the testis to the ejaculate), and blocking each vas to prevent sperm from passing (Figure 7.1, page 162). It usually takes 5–15 minutes to perform, after 5–10 minutes for preoperative preparation and administration of local anesthesia. Vasectomy is one of the safest and most effective family planning methods and is one of the few contraceptive options available for men. Failure rates are commonly quoted to be between 0.2% and 0.4%.

The clinical use of vasectomy is historically linked to the course of experimental investigation. Hunter made the first reference to the occluded vas during his dissections in 1775. The first experiment in tying the vas was reported as early as 1785, but it was not until the 19th century that several investigations into the effects of vasectomy were undertaken. In 1830, Cooper initiated the first systematic experimental work when he demonstrated that closing the duct of the testis had no effect on the production of sperm by the testis, for as long as six years after the operation. In the late 1890s, an investigation of the clinical uses of vasectomy was begun by surgeons in conjunction with therapeutic operations on the prostate gland. Ochsner performed such operations and reported that his clients experienced no change in their sexual function following a successful vasectomy.

In 1921, Simmonds noted that even in cases in which the vasa deferentia had been occluded for many years, there was no apparent injury to the sperm-producing functions of the testicles. Gosselin confirmed this in 1947. In the 1920s, Rolnick studied the regenerative power of the vas and its ability to resist trauma and to restore continuity of its lumen. He emphasized the importance of the blood supply and the sheath of the vas

Figure 7.1. Key points of male anatomy, before vasectomy and after vasectomy



(which acts as a splint) during recanalization of the vas.[1] This classic work still has pertinence today in efforts to achieve successful vas occlusion and to reduce the chance of failure, and informs us about the potential for successful vasectomy reversal.

In this chapter, we present descriptive information about vasectomy (approaches and occlusion techniques), analyze data on the effectiveness and complications associated with male sterilization, review issues related to reversal, and examine innovations that promise to improve upon current procedures.

[1] Recanalization occurs when the severed ends of the vas deferens spontaneously reconnect, and sperm resume passing through the vas.

Requirements for a Safe Procedure: An Overview

Among the key elements in providing appropriate sterilization services are assessing and screening potential vasectomy users, ensuring that they give informed consent, preventing infection, administering anesthesia adequately and safely, and giving thorough postoperative instructions.

There is no medical reason that would absolutely restrict a man's eligibility for vasectomy. Some conditions and circumstances indicate that certain precautions should be taken or that the procedure should be delayed (WHO, 1996). These include localized problems that make vasectomy more difficult to perform (such as inguinal hernia, large hydrocele or varicocele, cryptorchidism, and previous scrotal injury) or conditions that may be more likely to produce complications (such as diabetes, coagulation disorders, or AIDS). In cases of local skin infection, systemic infection, gastroenteritis, or filariasis, the provider should delay performing the vasectomy until the condition is resolved. When an intrascrotal mass is present, the vasectomy should be delayed until the cause of the mass is determined.

However, even when these conditions exist, vasectomy is safe and simple when undertaken with proper screening. Prior to vasectomy, a medical history should be taken and a limited physical examination should be given (including a genital exam); the penis, scrotum, and inguinal region should be inspected visually; and the scrotum should be palpated. Laboratory tests should not be routine but should be reserved for specific cases in which the provider suspects a condition that would make it necessary to take extra preparation or precautions.

The surgeon should verify that the vasectomy client has signed an informed consent form before beginning the procedure. Although the purpose of signing the form is to document informed consent, the principal focus should be on confirming that the vasectomy client has made an informed choice of vasectomy as a contraceptive method (see Chapter 1).

Strict adherence to good infection prevention practices at all times (before, during, and after surgery) is another crucial factor for the safety of the procedure. Proper aseptic technique is essential to prevent both immediate and long-term infectious morbidity and mortality. Inadequate infection prevention practices can lead to surgical-site infections, tetanus, and infections such as HIV/AIDS, hepatitis B, and hepatitis C (Grimes et al., 1982b; IPPF, 1997; Mangram et al., 1999). Shaving the scrotum is no longer recommended, as this significantly increases the chance of surgical-site infection (Cruse & Foord, 1980; Seropian & Reynolds, 1971).

Good anesthesia is essential for a pain-free vasectomy. Both conventional and no-scalpel vasectomies are performed almost exclusively under local anesthesia only. Premedication is not commonly used. Use of sedation or regional or general anesthesia is rarely needed and unnecessarily increases the risk and the costs of the procedure (Kendrick et al., 1985; Kendrick et al., 1987). However, general anesthesia may be necessary when there are scrotal abnormalities (such as large varicocele, large hydrocele, or cryptorchidism) or when vasectomy is performed along with another surgical procedure. Men who need modest sedation (e.g., those who are extremely nervous) may be given a small dose of an oral tranquilizer, such as diazepam.

Men undergoing vasectomy should receive clear instructions about postoperative care, anticipated side effects, actions to take if complications occur, sites where they can access emergency care, the need for postoperative semen analysis, and the time and place for making a follow-up visit.

Approaches

Regardless of the method of scrotal entry, the first step in the vasectomy is to identify and immobilize the vas through the skin of the scrotum. The second step is to bring the vas into the open. There are two approaches for doing this: conventional vasectomy and no-scalpel vasectomy.

Conventional vasectomy

In conventional vasectomy, the clinician uses a scalpel to make either one midline incision or two incisions in the scrotal skin, one overlying each vas deferens. Each incision is usually 1–2 cm long and is routinely closed with sutures after the vasectomy has been completed. In general, with conventional vasectomy, only the area around the skin entry site is anesthetized.

No-scalpel vasectomy

No-scalpel vasectomy (also known as NSV) was developed and first performed in China in 1974 (AVSC International, 1997; Li et al., 1991). This technique uses a vasal nerve block, created by first anesthetizing the scrotal skin and then making a deep injection of anesthetic alongside each vas. This provides better anesthesia than simply anesthetizing the skin around the entry point (AVSC International, 1997; Skriver, Skovsgaard, & Miskowiak, 1997; Sokal et al., 1999). Instead of a scalpel, two specialized instruments—a ringed clamp and a dissecting forceps (a sharp, curved hemostat)—are used (Figure 7.2). Because the scrotal skin puncture made with the dissecting forceps is so small, sutures are not needed.

No-scalpel vasectomy offers several advantages over conventional vasectomy: fewer complications (see Table 7.1), less pain during the procedure and early follow-up period, and earlier resumption of sexual activity after surgery (AVSC International, 1997; Skriver et al., 1997; Sokal et al., 1999). Because it requires no scrotal incision, no-scalpel vasectomy is believed to decrease men's fears about vasectomy (AVSC International, 1997). Neither conventional nor no-scalpel vasectomy is time-consuming, but it has been reported that the vasectomy procedure time is shorter when skilled providers use the no-scalpel approach (Li et al., 1991; Nirapathpongporn, Huber, & Krieger, 1990). Further details on no-scalpel vasectomy can be found in the book *No-Scalpel Vasectomy: An Illustrated Guide for Surgeons* (AVSC International, 1997).

Occlusion Techniques

Once the vas has been brought into the open, it is then occluded using a variety of methods, including ligation with sutures, division, cautery, application of clips, excision of a

Figure 7.2. In no-scalpel vasectomy, the clinician delivers the vas for ligation by piercing the skin of the scrotum with the medial blade of the dissecting forceps

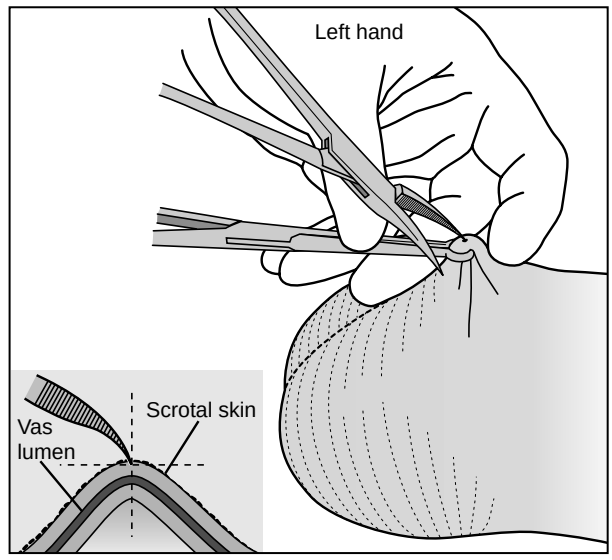


Table 7.1. Percentage of vasectomies in which infection or hematoma or bleeding occurred, by type of vasectomy and study

Study	No. of vasectomies	% with infections	% with hematoma/bleeding
Incisional vasectomy			
Philp, Guillebaud, & Budd, 1984	534	1.3	4.5
Kendrick et al., 1987	65,155	3.5	2.0
Nirapathpongporn, Huber, & Krieger, 1990	523	1.3	1.7
Alderman, 1991	1,224	4.0	0.3
Sokal et al., 1999	627	1.3	10.7
No-scalpel vasectomy			
Nirapathpongporn, Huber, & Krieger, 1990	680	0.2	0.3
Li et al., 1991	179,741	0.9	0.1
Li et al., 1991	238	0.0	0.0
Sokal et al., 1999	606	0.2	1.7
Arellano et al., 1997	1,000	0.0	2.1

segment of the vas, fascial interposition, or some combination of these. The same techniques are used to occlude the vas in both conventional and no-scalpel vasectomy.

Ligation is the most widely used technique. It involves tying the vas deferens with suture material, cutting it, and in many cases, removing a section of the vas.

Cautery—electrosurgical (electrical coagulation) or thermal—is done by inserting a needle electrode or a cautery device into the vas lumen to create a firm scar that will occlude the vas. Sometimes a segment of the vas is removed as well. With this method, only the inner layer of the vas is sealed closed; the muscle wall of the vas remains intact.[2]

Clips can be applied to the vas to compress a narrow segment and block the passage of sperm. After division of the vas, a clip is applied to both of the cut ends. Sometimes a segment of the vas is removed before the clips are applied.

Fascial interposition places a tissue barrier between the two cut ends of the vas. This is done by suturing (or securing with a clip) the thin layer of tissue that surrounds the vas (called the fascial sheath) over one end of the vas (Figure 7.3, page 166).

In some cases, these techniques are combined; for example, cautery may be used with clips, or ligation may be used with cautery. Ligation without division and division alone are not recommended, as the potential for failure due to recanalization is high. Some practitioners remove a section of the vas; others do not. Data to support the superiority of any of these vas-disruption techniques had been lacking, but several recent studies have suggested that there are some differences in effectiveness among different occlusion techniques (see Effectiveness).

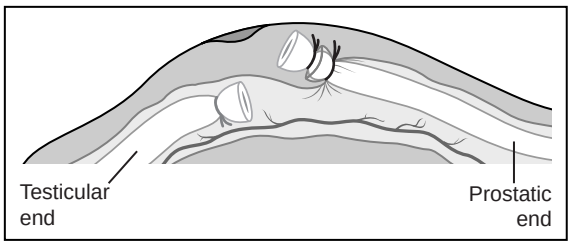
Although open-ended vasectomy—not sealing the testicular end of the cut vas—has been tried, it is not commonly used. Data have shown that this technique causes less pressure-induced damage to the epididymis (Silber, 1977). Thus, it is possible that vasectomy reversal will be more successful following an open-ended vasectomy. However, no studies on open-ended vasectomy and the success of reversal efforts have been reported in the literature.

Effectiveness

The contraceptive effects of vasectomy are not immediate, because viable sperm must be cleared from the vas. Thus, the vasectomy user and his partner(s) must practice alternate methods of contraception for some time after the procedure.

[2] This differs from the cautery method of tubal occlusion for women, whereby an entire segment of the fallopian tube is destroyed.

Figure 7.3. With fascial interposition, the fascial sheath (the thin layer of tissue that surrounds the vas) is sutured over one end of the cut vas



Ideally, vasectomy success can be routinely confirmed by demonstrating the absence of sperm (azoospermia) from one or more semen samples taken after the vasectomy, but there is little consistency in vasectomy follow-up protocols. Some providers ask men to return based on the time since the vasectomy, while others use the number of ejaculations since vasectomy, and yet others use some combination of both time and number of ejaculations (Alderman, 1988; Babayan & Krane, 1986; Haws et al., 1998; Rajfer & Bennett, 1988; Schmidt, 1987). In addition, providers vary in the number of azoospermic samples they require before they will tell a man it is safe for him to rely on his vasectomy for contraception (Babayan & Krane, 1986; Haws et al., 1998). This variety in postvasectomy follow-up protocols reflects the limited data available on determinants of azoospermia, including the time and number of ejaculations after vasectomy, as well as uncertainty over whether azoospermia is the best endpoint for vasectomy.

While the standard accepted endpoint of vasectomy has traditionally been achievement of azoospermia, some have discussed whether azoospermia is a necessary condition for the contraceptive effectiveness of vasectomy. A number of studies examining changes in sperm function after vasectomy, including fertilizing competence and sperm motility, have suggested that the duration of risk of pregnancy after vasectomy is shorter (and in some cases, much shorter) than the time necessary to reach azoospermia (Bedford & Zelikovsky, 1979; Cortes et al., 1997; Edwards, 1993; Jouannet & David, 1978; Lewis, Brazil, & Overstreet, 1984; Richardson, Aitken, & Loudon, 1984; Sivanesaratnam, 1985). A number of reports have shown that men with low numbers of nonmotile sperm remaining after vasectomy are at low risk of causing pregnancy (Alderman, 1989; Davies et al., 1990; De Knijff et al., 1997; Edwards, 1993; Edwards & Farlow, 1979; Philp et al., 1984; Thompson et al., 1991); some have suggested that these men can rely on their vasectomy for contraception even before reaching azoospermia (Davies et al., 1990; De Knijff et al., 1997; Edwards, 1993; Edwards & Farlow, 1979; Philp et al., 1984).

Endpoints of vasectomy other than azoospermia, however, have not been widely accepted. It is generally recommended that men have a semen analysis; in many cases, the suggested time for the semen analysis is a long time after the vasectomy (e.g., 12 weeks). During this time, couples must use an alternative method of contraception. If sperm are found in the semen at the first visit, additional visits are necessary. In many low-resource settings, it is impossible or impractical for men to have a semen analysis: Men may have no access to a facility that can do a semen analysis, they may be far from such a facility, or they may not have the money to pay for the analysis. In the United States and Europe, where semen analysis is widely available and more easily accessible, compliance with postvasectomy follow-up has been shown to be poor, with anywhere from 5% to 45% of men not returning for any follow-up (Belker et al., 1990; Dervin, Barnett, & Stone, 1982; Maatman, Aldrin, & Carothers, 1997; Smucker et al., 1991). This suggests that current follow-up protocols do not work very well, even under favorable circumstances.

In general, vasectomy is highly effective and one of the most reliable contraceptive methods available. Usually, vasectomy failure rates are quoted to be between 0.2% and 0.4%; however, a thorough review of the literature reveals published rates as high as 5% (Li et al., 1994; Schmidt & Free, 1978; Shapiro & Silber, 1979; Temmerman et al.,

1986). Vasectomy failure rates are generally believed to be similar to those for female sterilization, and they are lower than those for reversible methods. However, it is difficult to directly compare failure rates for vasectomy with those of other contraceptive methods, including female sterilization, since in most reports on vasectomy, rates are presented as failures per 100 procedures, while for other methods the measure most often used is failures per 100 person-years of use. Interpreting the literature on vasectomy failure rates is difficult for several reasons: Most published studies are retrospective reviews of individual physicians' experiences; follow-up has been relatively short-term and varies from one study to another; studies use different occlusion methods and different definitions of failure; and some studies are difficult to interpret because of limited details on the follow-up procedure that was used or on the numbers of men who did not return for follow-up.

Preliminary results from a randomized controlled trial found that use of fascial interposition with ligation and excision led to a more rapid decrease in sperm counts than when ligation and excision were used alone.

However, several recent studies suggest differences in the effectiveness of certain vas occlusion techniques. A study conducted in Mexico on time to azoospermia following vasectomy using ligation and excision alone showed a prolonged risk of continued fertility in an unexpectedly large percentage of men. Thirteen percent of men (28 of 217) showed potential fertility (defined as a sperm concentration of 3 million or more sperm per ml of semen) six months after the vasectomy. This finding suggests that recanalization was occurring more frequently than expected (Nazerali et al., 2002). Similar results were seen following an interim analysis of a randomized controlled trial of fascial interposition conducted at eight sites in seven countries: Only 76–86% of men reached azoospermia by 34 weeks after vasectomy in the group in which only ligation and excision was performed (Sokal et al., 2001).

A Canadian study indicates that failure is also higher than expected when clips are used instead of sutures. A retrospective review of computerized records of more than 2,500 men who had vasectomy with occlusion by clips or by cautery and fascial interposition found failure rates (based on semen analysis) of 8.7% for clips but only 0.3% for cautery and fascial interposition, a highly significant difference (Labrecque et al., 2001).

While fascial interposition has been promoted as a way to further reduce vasectomy failure rates, reported success rates have varied. Some studies have shown good results (Denniston, 1985; Esho & Cass, 1978; Schmidt, 1995), while others have found failure rates similar to those attained without use of the technique (Li et al., 1994; Philp et al., 1984). One survey of U.S. physicians found that 48% reported using fascial interposition (Haws et al., 1998).

Preliminary results from a randomized controlled trial found that use of fascial interposition with ligation and excision led to a more rapid decrease in sperm counts than when ligation and excision were used alone. When fascial interposition was used along with ligation and excision, about 93% of men had reached a low sperm count (less than 100,000 sperm per ml of semen) by 22 weeks after surgery, compared with only 81% of men when fascial interposition was not used. The results demonstrate that fascial interposition significantly improves the effectiveness of vasectomy by ligation and excision (Sokal et al., 2001).

Data comparing failure rates of open-ended and closed-ended vasectomy have varied, with some showing comparable failure rates (Denniston & Kuehl, 1994; Errey & Edwards, 1986; Moss, 1992) and some showing higher failure rates with open-ended vasectomy (Goldstein, 1983; Shapiro & Silber, 1979; Temmerman et al., 1986).

Besides the studies demonstrating higher-than-expected failure rates for vasectomy by ligation and excision or for vasectomy with clips, two provide evidence that post-vasectomy pregnancies are indeed more common than expected in general. The first, an analysis of Chinese vasectomy data from the 1988 National Demographic and Family Planning Survey, which used a nationally representative sample of more than 2 million respondents, found surprisingly high cumulative failure rates. Life-table methods indicated that among the more than 28,000 women who reported that their husbands had had a vasectomy, pregnancy rates after the vasectomy were 2.7 pregnancies per 100 women after one year and increased to 9.2 per 100 after 10 years (based on the women's reports

of pregnancy). Further analysis showed that lower-level hospitals, where the majority of male sterilizations were performed, had higher failure rates. In addition, husbands of younger women had much higher failure rates than husbands of older women. Unfortunately, no information is available on what occlusion methods were used for the vasectomies (Chen, 1999).

In the other analysis, a retrospective follow-up study, more than 1,000 Nepalese men were interviewed 1–4 years after vasectomy. The sample was randomly selected from more than 30,000 men in the hill districts of Nepal who had a vasectomy between 1996 and 1999. The estimated first-year pregnancy rate was 1.7 per 100 among wives of men having ligation and excision vasectomies. The cumulative probability of pregnancy at three years was 4.2 per 100 (Nazerali et al., 2001).

It is important to note that despite these recent findings, vasectomy remains a highly effective method of contraception. In addition, it is difficult to make general statements about vasectomy failure because of the wide variety of occlusion methods used. It is becoming clearer that some occlusion methods or combinations of occlusion methods are likely to be more effective than others.

There are two causes of vasectomy failure: user failure and failure of the technique itself. User failure is defined as when a pregnancy occurs before sperm have been cleared from the male reproductive tract postvasectomy. User failure could be related either to inadequate instruction or to the vasectomy user's failure to comply with instructions to use alternate contraceptive methods until azoospermia is confirmed.

Spontaneous recanalization of the vas is the most common cause of failure of the vasectomy technique itself, yet it is not well understood (Alderman, 1988). Recanalization occurs when a sperm granuloma forms at the vasectomy site, linking the two cut ends of the vas (Esho, Ireland, & Cass, 1974; Pugh & Hanley, 1969). In the case of vasectomy by ligation and excision, it is thought that failure may occur when the cut ends of the vas at the site of the ligature die and are sloughed off. A similar mechanism could be involved in recanalization following the use of clips.

When recanalization occurs in the first few months after vasectomy and before azoospermia has been achieved, it is called early recanalization. On the other hand, late recanalization occurs when sperm appear in the ejaculate after azoospermia has been demonstrated (Alderman, 1988; Philp et al., 1984). Late recanalization is usually identified when the partner of a vasectomized man becomes pregnant, and may occur several years after a seemingly successful vasectomy.

Rare causes of failure include congenital duplication of the vas that went undetected at surgery and a failure to identify and occlude the correct structure during the procedure (Alderman, 1988).

Complications

Intraoperative complications of vasectomy, such as vasovagal reaction, lidocaine toxicity, and excessive bleeding, are unusual. Staff can prevent vasovagal reaction by explaining the procedure to the client in advance, ensuring an effective anesthetic block, using gentle surgical technique, and reassuring the client during the procedure. Lidocaine toxicity and excessive bleeding can be prevented if providers follow appropriate vasectomy guidelines and procedures for administering local anesthesia and for the surgical technique.

Most postoperative vasectomy complications are minor, subsiding within 1–2 weeks. Common complaints after surgery are swelling of the scrotum, bruising, and pain. Minor bleeding under the skin is common. Some men experience tenderness or a dragging sensation in the scrotum for up to a week after vasectomy. A scrotal support, mild pain medication, and local application of ice are usually sufficient treatment.

More significant complications, such as heavy bleeding, hematoma (a collection of blood underneath the skin), or infection, are generally quite rare. The incidence of hematoma is related to the provider's experience with vasectomy: Physicians who per-

form larger numbers of vasectomies have lower hematoma rates than do those who perform fewer procedures (Kendrick et al., 1987).

Importantly, rates of heavy bleeding, hematoma, and infection vary depending on the approach taken to the vas. Numerous studies have demonstrated that the no-scalpel approach consistently results in lower rates of hematoma and infection than does conventional vasectomy (Table 7.1).

In most cases, using good surgical technique to minimize tissue trauma and limit bleeding, practicing aseptic technique, and giving clients good postoperative instructions can prevent bleeding, hematoma, and infection. Because the loose scrotal tissue allows injured blood vessels to continue bleeding, it is important to maintain good hemostasis during the procedure if hematoma formation is to be prevented. Many hematomas can be prevented if men avoid physical activity for a few days after the procedure; clients should be carefully instructed in this regard.

In most cases, using good surgical technique to minimize tissue trauma and limit bleeding, practicing aseptic technique, and giving clients good postoperative instructions can prevent bleeding, hematoma, and infection.

Sperm granulomas can occur either at the site of vas occlusion or in the epididymis. These small nodules form when sperm leak out of the vas or the epididymis, inducing an inflammatory reaction. While the true incidence of sperm granulomas following vasectomy is not known, they are seen in 15–40% of men having vasectomy reversal (Balough & Argenyi, 1985; Peterson, Huber, & Belker, 1990). This provides a reasonable estimate for incidence in men following vasectomy, in that rates of granuloma formation are likely to be similar in men having a reversal and in the general population of vasectomized men.

The majority of sperm granulomas are asymptomatic. Only 2–3% of vasectomized men have sperm granulomas that are painful or in some way symptomatic; most of these occur in the second or third week after the procedure (Kendrick et al., 1987; Peterson et al., 1990; Rajfer & Bennett, 1988). The factors that lead to the formation of sperm granulomas are not well understood; thus, there are no measures known to prevent or decrease their occurrence.

Long-Term Effects

Potential physiological effects and long-term sequelae of vasectomy have been the subject of extensive research over the past two decades. This research provides reassurance that vasectomy does not have any significant long-term negative physical or mental health effects. Results of large-scale, well-designed epidemiological studies in men have consistently shown no adverse effects of vasectomy in terms of heart disease, testicular or prostate cancer, immune complex disorders, and a host of other conditions. Vasectomy appears to be a largely safe and highly effective method of contraception, certainly with risks no greater than those for any of the contraceptive methods used by women.

Comprehensive studies of disease incidence

Five large-scale retrospective cohort studies have examined the incidence of a number of diseases in thousands of vasectomized and nonvasectomized men (Goldacre et al., 1978; Goldacre & Vessey, 1979; Massey et al., 1984; Nienhuis et al., 1992; Petitti et al., 1983; Schuman et al., 1993; Walker et al., 1981). For the disease categories or organ systems studied, vasectomized men were no more likely to be hospitalized or to develop a disease than were controls. In these studies, there were large numbers of cases of disease among both vasectomized and nonvasectomized men in all categories. Thus, taken together, the studies are reassuring that vasectomy does not increase the risk of adverse physical or mental health outcomes.

Effects on cardiovascular function

Reports that vasectomized monkeys developed atherosclerosis more rapidly than unvasectomized controls (Alexander & Clarkson, 1978; Clarkson & Alexander, 1980) led to

extensive research into the potential effects of vasectomy on cardiovascular disease in men. Since the early 1980s, most of the cohort, case-control, and cross-sectional studies that were conducted have found no association of vasectomy with acute myocardial infarction, other ischemic heart disease, stroke, peripheral vascular disease, hypertension, coronary artery disease, or hypertensive and atherosclerotic retinal vascular changes (Giovannucci et al., 1992; Goldacre et al., 1978; Goldacre & Vessey, 1979; Massey et al., 1984; Nienhuis et al., 1992; Petitti et al., 1983; Rimm et al., 1983; Rosenberg et al., 1986; Schuman et al., 1993; Walker et al., 1981).

Antisperm antibodies

The number of circulating antisperm antibodies increases after vasectomy: Antisperm antibodies are found in 50–80% of vasectomized men (Bernstein et al., 1979; Hellema & Rumke, 1978; Lenzi et al., 1997), but in only 8–21% of men in the general population (Gubin, Dmochowski, & Kutteh, 1998). The theoretical concern that these antibodies may have adverse health consequences has led to numerous studies, the results of which have shown no evidence of any immunological or other diseases related to the formation of antisperm antibodies after vasectomy (Coulson et al., 1993; Giovannucci et al., 1992; Goldacre, Holford, & Vessey, 1983; Lepow & Crozier, 1979; Massey et al., 1984; Petitti et al., 1982; Rimm et al., 1983; Walker et al., 1981). However, antisperm antibodies may play a role in decreased fertility after vasectomy reversal.

Prostate cancer

Since the mid-1980s, more than a dozen epidemiological studies of the risk of prostate cancer after vasectomy have been reported in the literature. Results have been difficult to interpret because of conflicting study findings, lack of a convincing biological mechanism for an association between vasectomy and prostate cancer, and generally weak associations when they have been found. Also, the potential for bias in some studies was high and likely led to an overestimation of any effect (Bernal-Delgado et al., 1998).

Based on the results of the research published to date, there is little evidence for a causal association between vasectomy and prostate cancer (Peterson & Howards, 1998). A panel of experts gathered by the U.S. National Institutes of Health in 1993 concluded that no change in the current practice of vasectomy was necessary nor should vasectomy reversal be done as a measure to prevent prostate cancer (Healy, 1993). Studies published after the expert panel report support these conclusions (Bernal-Delgado et al., 1998; Peterson & Howards, 1998).

Postvasectomy pain syndrome

A small percentage of vasectomized men have reported chronic pain in the testis following vasectomy (Choe & Kirkemo, 1996; Ehn & Liljestrand, 1995; McMahon et al., 1992). While up to one-third of men have reported occasional testicular discomfort following vasectomy, only around 2% of all vasectomized men said that the pain had negatively affected their life or that they regretted having had the vasectomy because of chronic pain (Choe & Kirkemo, 1996; McMahon et al., 1992). Conservative therapy such as nonsteroidal anti-inflammatory drugs, sitz baths, antibiotics, or spermatic cord blocks is sufficient treatment in most cases. When this fails, there is some evidence that vasectomy reversal or denervation of the spermatic cord may be helpful (Ahmed et al., 1997; Myers, Mershon, & Fuchs, 1997).

Mortality

Mortality following vasectomy has generally been very low. The few reports from the literature have demonstrated minimal mortality associated with vasectomy (Grimes et al., 1982a; Grimes et al., 1982b; Khairullah, Huber, & Gonzales, 1992; Strauss et al.,

1984). The most comprehensive study, based on data from more than 400,000 vasectomies worldwide, reported a mortality rate of 0.5 deaths per 100,000 vasectomized men (Khairullah et al., 1992). In addition, since 1990, EngenderHealth has become aware of only one vasectomy-related death (due to a postoperative infection at the surgical site) from among the more than 200,000 vasectomy procedures reported between 1990 and 2000 in EngenderHealth-supported programs around the world. Although reporting of mortality related to sterilization services is voluntary and complications are known to be underreported, vasectomy-related mortality clearly is quite low.

Vasectomy Regret and Reversal

Regret

Regret following a vasectomy is more common among men who at the time of the vasectomy were in an unstable marriage, were younger than 31, or had no children or had very young children, or among men who made the decision to have a vasectomy during a time of financial crisis or for reasons related to a pregnancy (Clarke & Gregson, 1986; Howard, 1982; Kjersgaard, Thranov, & Rasmussen, 1987; Shain, 1986). Providers should use risk factors for regret to identify men who may need more in-depth counseling to ensure that vasectomy is right for them at the time, but not to deny vasectomy to men who want it. In addition, the fact that regret is often seen when vasectomy users have an adverse health effect that is either caused by the procedure or perceived to be caused by it underscores the importance of good counseling prior to the procedure (see Chapter 5 for more information about regret).

Reversal

The most common reasons for reversal requests are remarriage after divorce or after the death of a partner, the death of one or more children, a desire for more children, or problems of either a physiological or psychological nature that the vasectomized man or his provider believe will be alleviated by vasectomy reversal (Belker et al., 1991; Howard, 1982; Myers et al., 1997; Owen & Kapila, 1984).

Vasovasostomy (reattaching the cut ends of the vas) is the most common procedure for reversing a vasectomy. In some situations, it may be necessary to attach the vas directly to the epididymis; this procedure is known as vasoepididymostomy. Both procedures are complex, technically demanding, and expensive; most importantly, there is no guarantee that fertility can be restored. This highlights the importance of carefully screening, counseling, and selecting vasectomy users.

Both macroscopic and microsurgical techniques for vasovasostomy and vasoepididymostomy have been used for vasectomy reversal; the current consensus is that microsurgical techniques are more successful (Belker et al., 1991; Belker, 1998; Fox, 1997). Reported rates of patency (evaluated by the presence of sperm in the ejaculate) following vasovasostomy range from 74% to 92% for macroscopic reversal and from 75% to 100% for microsurgical reversal (Belker et al., 1991; Cos et al., 1983; Huang et al., 1997; Kessler & Freiha, 1981; Lee, 1986; Mason et al., 1997). Reported pregnancy rates are lower, however, ranging from 35% to 57% for macroscopic and from 38% to 82% for microsurgical vasovasostomy approaches (Belker et al., 1991; Fallon, Miller, & Gerber, 1981; Lee, 1986; Owen & Kapila, 1984; Takihara, 1998). Vasoepididymostomy is generally less successful than vasovasostomy, and while pregnancy rates as high as 42–55% have been reported (Kolettis & Thomas, 1997; Marmar, 1995; Silber, 1989; Thomas, 1993), most are lower, ranging from 10% to 30% (Berardinucci, Zini, & Jarvi, 1998; Jarow, 1995; Matthews, Schlegel, & Goldstein, 1995; Takihara, 1998).

Several factors affect the success of vasectomy reversal: the technical demands of the surgery itself; the type of vasectomy procedure performed; the length of time between the vasectomy and the reversal procedure; the levels of antisperm antibodies that may

have developed after the vasectomy or the reversal; and changes in the epididymis or partial obstruction of the vas after reversal that prevent sperm from moving through the vas.

The time that has elapsed between vasectomy and reversal is a major factor in the success of reversal: The longer the interval between vasectomy and reversal, the less likely the man is to be fertile after reversal. Reversal is usually more successful when it is done within 10 years of the vasectomy; pregnancy rates drop to less than 50% when vasectomy reversal is performed more than 9–10 years later (Belker et al., 1991; Huang et al., 1997; Takihara, 1998).

Reports of the effect of antisperm antibodies on fertility following vasectomy reversal vary; some studies have shown decreased pregnancy rates due to antisperm antibodies, while others have not (Huang et al., 1997; Meinertz et al., 1990; Newton, 1988; Thomas et al., 1981). The consensus is that fertility following vasectomy reversal is inhibited only by high levels of antisperm antibodies (Lea, Adoyo, & O'Rand, 1997).

Partial obstruction of the vas after vasectomy reversal (e.g., because of a sperm granuloma or adhesions from the surgery) has been shown to affect the success of reversal (Carbone et al., 1998; Fox, 1997; Thomas et al., 1981). In these cases, semen quality may be poor in terms of sperm numbers, sperm motility, or both. When partial obstruction is the cause for failure of reversal, repeat vasectomy reversal has produced good pregnancy results (Belker et al., 1991; Fox, 1997).

Assisted reproduction technologies have been successful in vasectomized men who want children but who either do not want to attempt a vasectomy reversal or have had one or more unsuccessful reversal surgeries. Sperm can be retrieved from the epididymis or testis and then used in a procedure known as intracytoplasmic sperm injection (ICSI), in which sperm are injected directly into the ova in a laboratory. Pregnancy rates following ICSI with epididymal sperm are reported to be between 25% and 36% (Aboulghar et al., 1997; Craft et al., 1995a; Craft et al., 1995b; Dohle et al., 1998). Pregnancy rates ranging from 17% to 36% have been reported when testicular sperm are used (Aboulghar et al., 1997; Abuzeid, Sasy, & Salem, 1997; Craft et al., 1995a; Meniru et al., 1997; Watkins et al., 1997).

Research continues on methods of vasectomy reversal that produce better success rates. Additionally, new assisted reproduction techniques are also being explored that might be applied in the cases of vasectomized men who are interested in having children. However, there is no guarantee that pregnancy will occur following vasectomy reversal or use of assisted reproduction techniques, and these procedures are expensive and not widely available—especially in low-resource settings. Thus, vasectomy should be considered a permanent contraceptive method.

Innovations

New methods of vas occlusion are unlikely to become available in the near future, but investigators have explored several alternatives to surgical sterilization in men. Experimental methods of occluding the vas include injecting chemicals into the vas percutaneously (through the skin), to scar the vas closed or physically block the passage of sperm through the vas. In theory, percutaneous occlusion of the vas could offer several potential advantages over vasectomy as a male contraceptive, as it would be less invasive and thus might have a lower rate of complications. Such a procedure might also be quicker or easier to perform. In addition, some types could be reversed more easily, and the approach may be more acceptable, since it does not involve surgery.

Studies on occluding the vas for contraceptive purposes by injecting chemicals percutaneously began in the 1970s in China (Xiao, 1987; Zhao, 1990). This technique was easily performed and led to high rates of azoospermia and low pregnancy rates, although reversal was no easier than for vasectomy because the occluded portion of the vas needed to be excised and reanastomosis of the vas performed (Xiao, 1987; Zhao, 1990). Concerns about the safety of these chemicals have limited exploration of this approach. It is possible that a suitable method for chemically scarring the vas may be found in the future, and although reversal may not be any easier than for vasectomy, the technique

may offer other advantages over vasectomy in terms of ease of procedure, number of complications, or cost.

Formed-in-place plugs use a liquid material that is injected into the vas and forms a solid plug to block the vas lumen; such plugs have been examined as a method of vas occlusion. A formed-in-place polyurethane plug had low rates of complications, was highly effective, and was easily reversible (Zhao, 1990; Zhao et al., 1992a). However, uncertainty regarding the safety of the polyurethane product led to an investigation of medical-grade silicone plugs. Variable rates of success have been reported for a formed-in-place silicone plug known as Vasoc (Soebadi, Gardjito, & Meurik, 1995, Zambon et al., 2000; Zhao, Zhang, & Yu, 1992b). Vasoc vas occlusion does not appear to be suitable for use as a male contraceptive at this time: Not only are there questions about efficacy, but given the complex and technically demanding nature of the technique, the need for specialized and costly equipment and supplies (including refrigeration or freezing for the materials), and the need for three people to perform the procedure, service-delivery constraints would likely limit the method's utility in low-resource settings.

Researchers have also attempted to develop devices that can be placed in the vas to obstruct sperm but then later can be removed or opened to allow sperm to pass. Such devices have had several problems, however; for example, the surgery has been difficult and the devices have not consistently stayed in place within the muscular vas.

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Chapter 8

Future Use of Sterilization

Highlights:

- The prevalence of sterilization will rise substantially in the next 15 years in many countries, as part of a rise in overall contraceptive use, and the absolute number of users will increase as well, due both to climbing prevalence and to growing populations.
- Between 2000 and 2015, sterilization prevalence is likely to grow in many countries in Latin America and the Caribbean. Levels will remain highest in Brazil, and are likely to increase modestly in such countries as Argentina, Chile, Colombia, Cuba, Ecuador, and Peru. The very high levels of sterilization seen currently in the Dominican Republic probably will decline as temporary methods take a larger share of overall contraceptive use.
- In Sub-Saharan Africa, where sterilization prevalence now is relatively low, usage is expected to rise along with contraceptive use in general. Sterilization prevalence is expected to rise substantially in Botswana, Kenya, South Africa, Tanzania, and Zimbabwe. Ghana and Nigeria, which currently have a low level of sterilization prevalence, can expect to see it rise modestly.
- Sterilization prevalence in most Asian countries is projected to remain stable or decline slightly, but is likely to fall substantially in China, India, and the Republic of Korea, where prevalence currently is highest. Bangladesh and Pakistan, where sterilization prevalence is moderate, will see a more modest decline over the 15-year period. However, prevalence is expected to rise modestly in Vietnam and more dramatically in the Philippines between 2000 and 2015, and Indonesia is expected to experience a slight rise in prevalence.

Today, more than one-fourth of the world's 6 billion people are between the ages of 10 and 24, making this the largest group ever to enter adulthood (PRB, 2000). This "critical cohort"—86% of whom live in developing countries—will determine the shape and size of the world's future population through their fertility decisions during their reproductive years. While the total fertility rate is declining in many regions of the world, population momentum necessitates that family planning programs adjust and expand to meet the needs of the growing population. In addition to offering comprehensive family planning services, programs must consider the need to adopt a life-cycle approach, with education for young people about sexual and reproductive health and a range of temporary and permanent contraceptive methods that may be appropriate for them during different stages of their lives. No doubt, female and male sterilization will become a contraceptive choice for many of these individuals in the future.

This chapter examines the changing definition of unmet need for contraception, the global demand for sterilization through a look at projections of future sterilization prevalence, and the characteristics of potential sterilization users. Though future sterilization use in a particular country may be altered by unpredictable factors, such as a change in the legal status of sterilization, the development of new methods, or economic circumstances affecting family planning programs, the estimates presented here should be useful for those who are planning and managing family planning services.

Unmet Need for Contraception

The concept of an unmet need for contraception emerged in the 1960s from the results of family planning knowledge, attitude, and practice (KAP) surveys, which indicated that a considerable number of women who wanted to stop childbearing were not practicing contraception. The definition of unmet need for family planning used in the Demographic and Health Surveys (DHS) is as follows:

> A currently married/in union, fecund woman can be defined to have unmet need for family planning if she says she would prefer either to postpone her next pregnancy by at least two years from the time of the survey or [to] avoid having any more children and is not using any method of family planning; or she is pregnant or amenorrheic postpartum, the current or recent pregnancy was mistimed or unwanted, and she was not using any method of family planning at the time she conceived (Westoff & Ochoa, 1991).

While this definition has been used to measure levels of unmet need worldwide, it has been criticized as a construct that is derived from large-scale surveys but that misses several key elements in addressing the issue of unmet need. Critics assert that it represents a mechanistic approach to fertility regulation that excludes important categories of women from consideration (e.g., women using a less-effective method, those using a theoretically effective method incorrectly, and sexually active unmarried women, who are normally excluded from these surveys[1]) and is not a direct measure of women's self-defined need for family planning services (Bongaarts & Bruce, 1995; Dixon-Mueller & Germain, 1992; Yinger, 1998). Thus, to capture the broad range of women who can be classified as having an unmet need, as well as to achieve a greater understanding of the underlying causes for this need, qualitative and quantitative research methodologies for measuring unmet need for contraception have had to become increasingly refined.

A modified definition of unmet need presented by Yinger (1998) reflects the array of risks of unintended pregnancy rather than the risk from nonuse of family planning alone. Since unintended pregnancies result from method failure, incorrect use of methods, use of highly ineffective methods, and nonuse of methods, a continuum of risk is proposed that includes each of these cases, in categories ranging from low risk to very high risk. Also considered in the continuum are factors such as contraceptive dissatisfaction and future intended use. As a result of the adoption of the more inclusive definition of unmet need, women who are classified as having a "met" need at the time of measurement, yet who may have a subsequent unmet need (e.g., due to contraceptive discontinuation), are included in the continuum. This broader characterization of unmet need moves beyond the dichotomous measure of contraceptive use or nonuse to take into account the multiple pathways that can lead women to an unintended pregnancy (Supplement 8.1, page 193).

Until recently, studies have focused exclusively on the unmet needs of women. Policy formation and program development in many countries have relied on fertility and family planning data collected from women. However, as current research suggests, women and men do not necessarily have similar fertility attitudes or goals (Bankole & Singh, 1998; Becker, 1999; Klijzing, 2000; Ngom, 1997; Wolff, Blanc, & Ssekamatte-Ssebuliba, 2000). The decision to stop childbearing by using contraception often occurs as a result of a complex decision-making process, with results that may not reflect consensus between partners. In some countries or social groups, the male partner has greater influence on the decision, while in other areas, the female partner's fertility preference exerts a stronger influence on the couple's contraceptive behavior (Bankole & Singh, 1998). The decision likely varies by time and location, and depends on several factors, including cultural norms, communication, and amount of negotiation (Wolff et al., 2000). A failure to include men in family planning efforts may have serious conse-

[1] The reproductive health surveys carried out by the Centers for Disease Control and Prevention include an analysis of unmet need that encompasses all women (Morris, 2001).

quences for the level of unmet need for contraception in developed and developing countries alike (Cohn & Burger, 2000).

The concept of men's unmet need for contraception has been introduced through research in Ghana and Kenya that utilized DHS data to analyze unmet need among men and couples (Ngom, 1997). Couples' unmet need is measured as the proportion of *marital* pairs with at least one partner having an unmet need for contraception. Married men were found to have levels of unmet need slightly lower than those of women (Ngom, 1997). In contrast, an aggregate-level study on unmet need in Europe comparing the fertility preferences and contraceptive behavior of men and women in 10 countries (Klijzing, 2000) showed that men and women had differing levels of unmet need, with men having generally higher levels. A study that calculated unmet need among wives, husbands, and couples in Bangladesh, the Dominican Republic, and Zambia found a substantial difference in estimates of unmet need between the three groups (Becker, 1999). Researchers from all of these studies posit that the discrepancies between the unmet need of men and women lie with disagreement or lack of communication about reproductive goals or contraceptive use among couples. This issue, along with several others not related to access, has not conventionally been included in the discussion of unmet need for contraception.

Whereas the traditional interpretation of unmet need focused on access to contraceptive services and supplies as the main barrier to the use of family planning, research findings suggest that the principal reasons for nonuse are lack of knowledge, fear of side effects, and social or familial disapproval (Bongaarts & Bruce, 1995). Additional research concentrating on women's perceptions of unmet need supports these findings and puts forward a multifaceted approach to understanding the causes for the gap between contraceptive need and use. Several issues that should be considered in the effort to refine the concept of unmet need and enhance its utility at the country level include informed choice, fears and rumors about contraceptive methods, sociocultural issues, and gender subordination as factors in contraceptive decision making among couples, as well as quality of care (Yinger, 1998).

Many of the issues that have emerged from recent studies on unmet need for contraception can be applied specifically to the unmet need for contraceptive sterilization to limit births. It is important to bear in mind the underlying causes of unmet need when considering the projected demand for sterilization. Countries that are able to address some of the key issues surrounding unmet need will likely experience a greater increase in demand for sterilization than will countries with policies that remain stagnant.

Projections of Future Sterilization Prevalence

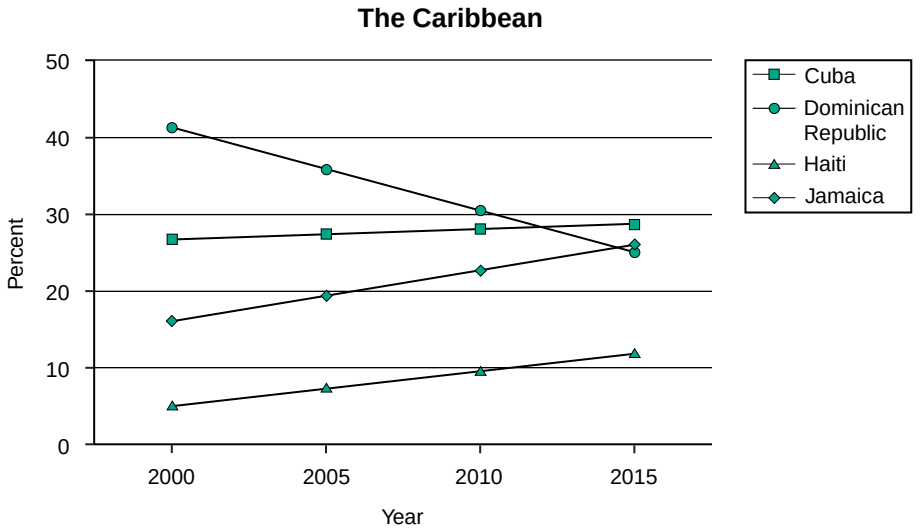
The projections of the future prevalence of sterilization that are presented in this chapter derive from a method relating sterilization increases to total contraceptive use, which in turn is based on United Nations (UN) projections of fertility change. The data have been obtained from a previously published monograph (Ross, Stover, & Willard, 1999).

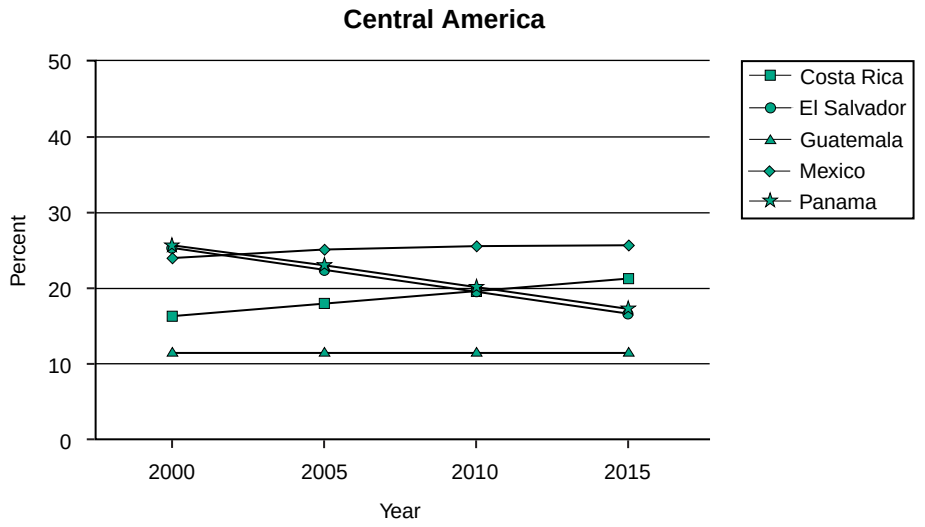
The data presented here on the estimated future prevalence and numbers of female and male sterilization users are displayed by region. Supplement 8.2 (page 194) shows the projected prevalence for women in 2000, 2005, 2010, and 2015, while Supplement 8.3 (page 197) presents similar information for the male partners of women. Figure 8.1 (page 182) displays the projected trend in total sterilization prevalence (both women and men) for selected countries in each of the world's regions, highlighting both countries with high sterilization prevalence and countries with large populations.

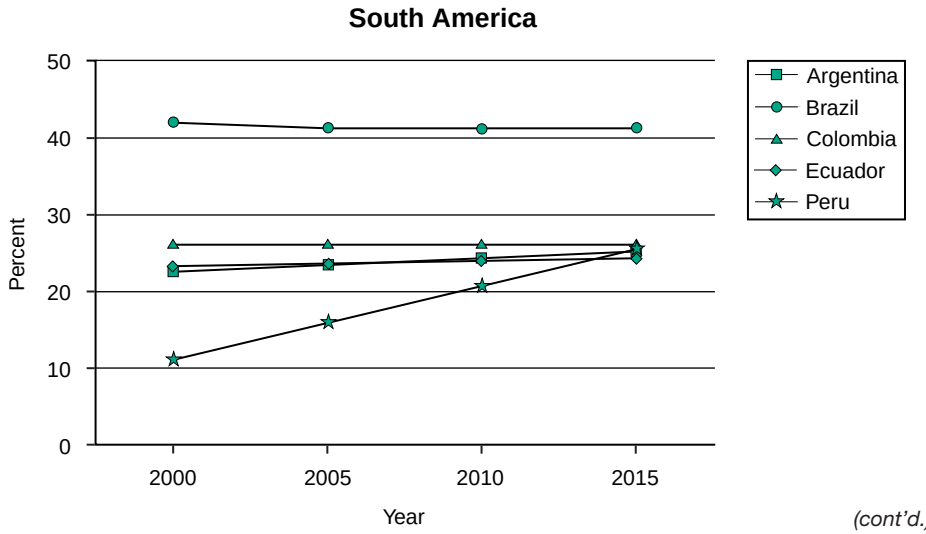
Because recent trends for the more developed countries have been relatively stable, we did not generate projections of future sterilization prevalence for them. Sterilization prevalence in the next 15–20 years is not likely to differ dramatically from the level seen today in these countries, although the numbers of sterilization users may increase simply as a factor of population growth.

In many countries, the prevalence of sterilization will rise substantially in the next

Figure 8.1. Projected total percentage of couples using sterilization, by year, according to region







(cont'd.)

Figure 8.1. Projected total percentage of couples using sterilization, by year, according to region *(cont'd.)*

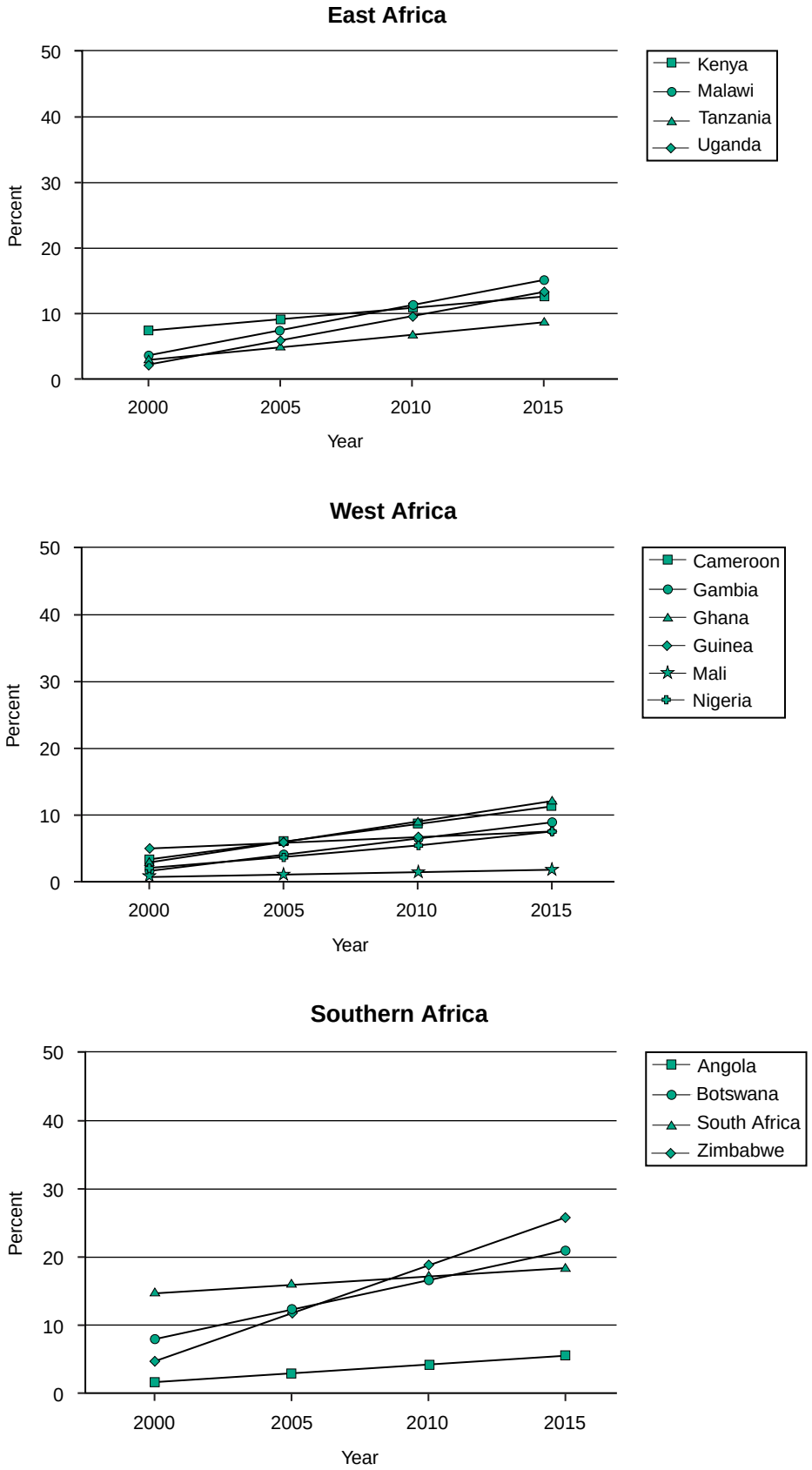


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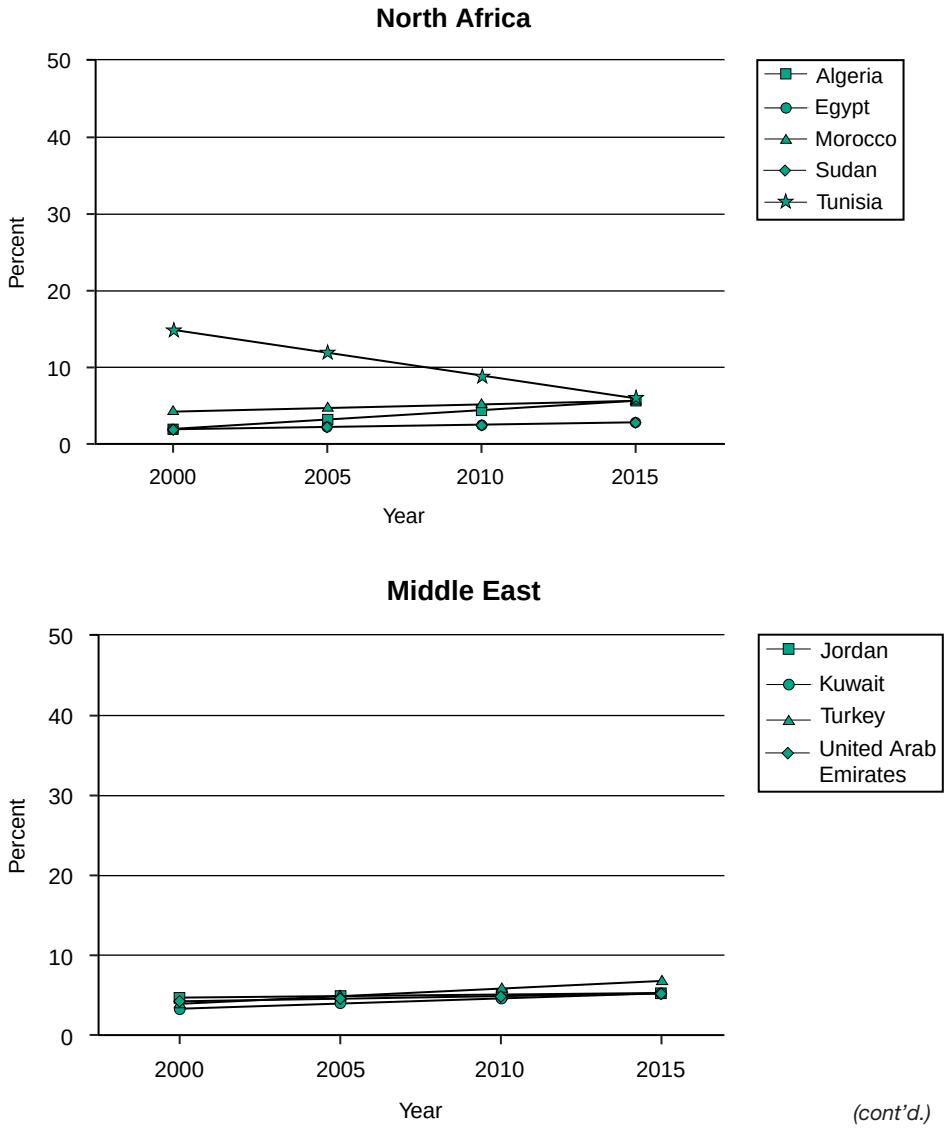
Figure 8.1. Projected total percentage of couples using sterilization, by year, according to region *(cont'd.)*

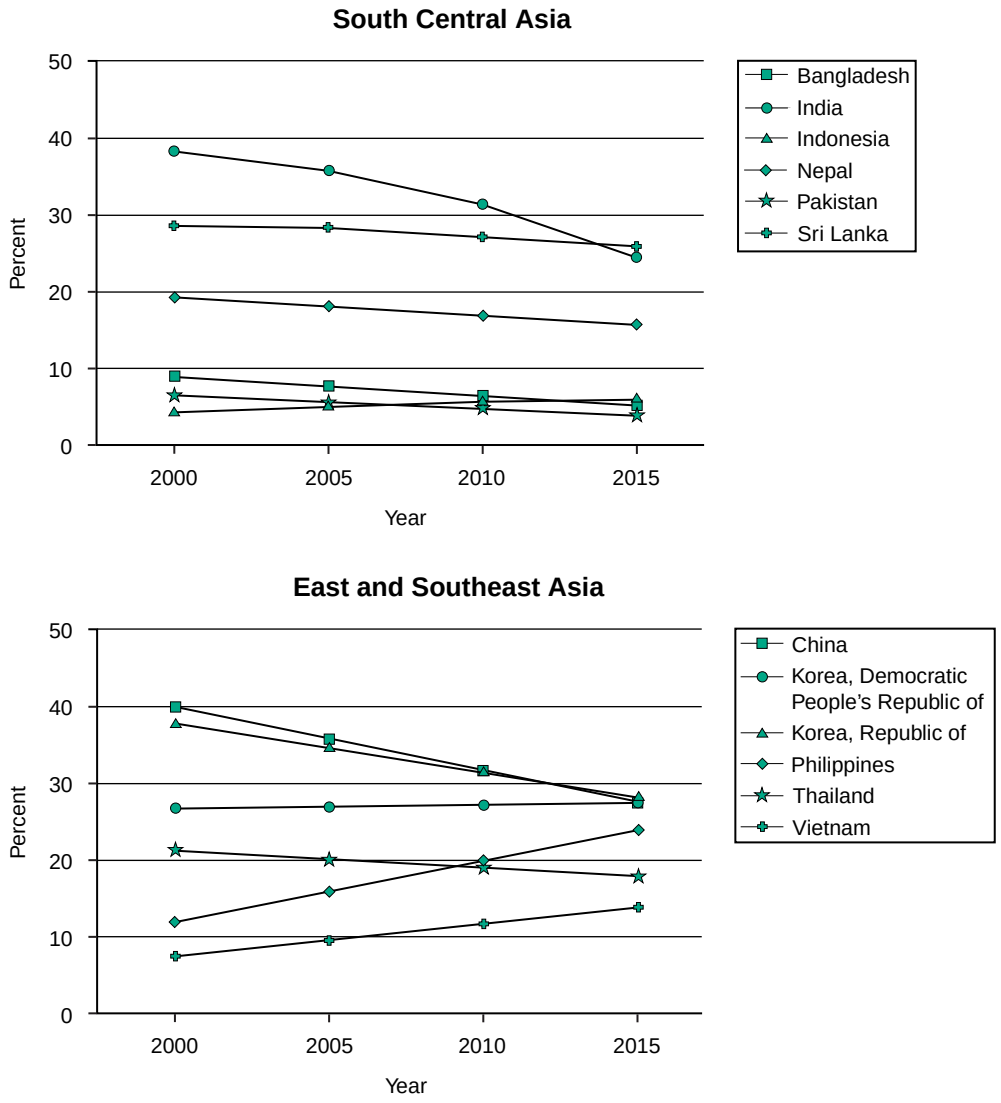


(cont'd.)

15 years, as part of a rise in overall contraceptive use. The numbers of users will rise as well, due both to increasing prevalence and to population growth. Prevalence may rise especially in countries with a changing age distribution—where the age distribution shifts in favor of the high-sterilization age-groups (centered on age 30, the mean age of sterilization in countries with high sterilization use). In countries where sterilization's prevalence has been high for decades, use may remain level or even decline slightly, as temporary methods become more prominent. Declines are seen where sterilization prevalence is historically high in the population of reproductive age and where the oldest cohort of sterilization users will be aging out of the population of reproductive age at a higher rate than the younger age-groups adopt the method.

The projected trend in sterilization prevalence between 2000 and 2015 for selected countries in Latin America and the Caribbean (Figure 8.1) is that it will remain highest in Brazil, leveling off at slightly above 40%. Most other countries in the region (including Argentina, Chile, Colombia, Cuba, and Ecuador) are likely to experience a modest increase in sterilization prevalence over the 15-year period, with levels rising to approximately 25–30% by 2015. Peru, like other Latin American countries with currently low reliance on sterilization, is expected to more closely resemble its neighbors in ster-

Figure 8.1. Projected total percentage of couples using sterilization, by year, according to region *(cont'd.)*



ilization prevalence by 2015 (with an increase from roughly 10% to 25%). The very high levels of sterilization in the Dominican Republic (more than 40% in 2000) reflect past prosterilization policies and a high demand for the method (Portes, 1983; Potter, 1986), but sterilization prevalence there is expected to decline as temporary methods take a larger share, so that levels of sterilization eventually resemble those seen in some neighboring countries.

In Sub-Saharan Africa, the prevalence of sterilization, particularly of male sterilization, is relatively low. However, sterilization usage is expected to rise along with contraceptive use in general. As shown in Figure 8.1, in 2000 the three countries in the region with the highest sterilization prevalence were South Africa (almost 15%) and Botswana and Kenya (roughly 7% each). Prevalence in these countries is expected to rise to between 13% and 20% by 2015, with the use level expected to be particularly high in Botswana. Sterilization prevalence is expected to rise dramatically in Zimbabwe over the same period, from approximately 5% to 25%, a change driven partly by its rapid population growth. Tanzania will likely experience a more moderate rise in sterilization prevalence (of about six percentage points). Ghana and Nigeria currently have a low level of sterilization prevalence but are expected to see it rise modestly, to 8% and 12%, respectively.

In North Africa and the Middle East, sterilization prevalence has historically been low everywhere but in Tunisia and is not expected to rise dramatically in the next 20 years. The projected trend for most countries in the regions, shown in Figure 8.1, is a modest increase in prevalence over the 15-year period, to a median level of roughly 5% in 2015. Tunisia is an exception to this projected trend: Under the projection methodology, its sterilization prevalence declines as total contraceptive prevalence rises and the use of other methods increases, especially among younger women.

In the former Soviet republics, including the Caucasus, the Central Asian republics, Moldova, Russia, and Ukraine, the prevalence of sterilization is projected to converge to roughly 25–30% in 2015 (data not shown), although current prevalence is low, at less than 5% (see Chapter 2). Under the projection methodology, the Central Asian republics of Kazakhstan, Tajikistan, and Uzbekistan, as well as Moldova and Russia, may see a marked rise in sterilization prevalence *if* there is a change in public interest in the method and *if* access to services is expanded. Under the projection methodology, the rise in sterilization prevalence follows the course taken by total contraceptive prevalence. The lower the initial contraceptive prevalence estimate, the more marked a rise in sterilization prevalence is expected.

In Asia, where sterilization has for decades been the most commonly used contraceptive method, sterilization prevalence for most countries is expected to remain level or to decline slightly. Sterilization accounted for roughly 40% of modern method use in 2000 (Ross et al., 1999). Prevalence was highest in China, India, and the Republic of Korea in 2000 and is expected to decline substantially by 2015, to an estimated 25%, in the end matching the level expected in both Koreas and Sri Lanka (Figure 8.1).[2] Countries such as Bangladesh and Pakistan, where sterilization prevalence is moderate, will see a more modest decline over the 15-year period.

Vietnam and the Philippines represent countries that are exceptions to the trend of decreasing prevalence seen in the region: Between 2000 and 2015, prevalence is expected to rise modestly in Vietnam, from roughly 7% to 14%, and more dramatically in the Philippines, from slightly more than 10% to 25%. Indonesia is expected to experience a slight rise in prevalence (of about one percentage point). In these cases, the increases are driven, under the projection methodology, by lower initial estimates of sterilization prevalence. In general, sterilization prevalence in Asia is projected to converge to between 15% and 30% overall. Even where prevalence may decline, however, the absolute numbers of sterilization users will nevertheless increase, due to projected population growth (see Supplements 8.2 and 8.3).

Characteristics of Potential Sterilization Users

Examining characteristics in order to monitor trends in sterilization use is essential for adapting sterilization and family planning programs to the changing needs of users. Chapter 3 examines selected characteristics of current sterilization users, such as age at sterilization (including trends over time), level of education, residence, and previous use of modern contraceptive methods. In this section, we examine selected characteristics of women who are currently in union, are fecund, and want no more children who may adopt sterilization in the future. Knowledge of the profiles of potential sterilization users can be used to estimate future sterilization demand, as well as to improve the quality of sterilization education and services.

The data in Table 8.1 are derived from nationally representative population-based surveys conducted by the Demographic and Health Surveys (DHS) project and the U.S. Centers for Disease Control and Prevention (CDC) of women of reproductive age. Three

[2] China and the Republic of Korea show marked declines in prevalence for two reasons: First, under the projection methodology, the proportion of the total contraceptive prevalence taken up by sterilization is less at the highest levels of prevalence; additionally, prevalence is estimated using UN projections of the total fertility rate, which in China and the Republic of Korea are expected to reverse direction in the future (Ross, 2000).

Table 8.1. Percentage distribution of fecund women aged 15–49 currently in union and wanting no more children, by selected characteristics, according to potential sterilization use and country

	Age		No. of living children			Level of education		Residence		Modern method use	
Country/year/source	<30	≥30	0–2	3–4	≥5	≤primary	≥secondary	Urban	Rural	Ever used	Never used
Nonusers considering sterilization											
Egypt, 1995–1996 (DHS)	24.5	75.5	26.4	34.5	39.0	77.4	22.6	44.6	55.4	76.5	23.5
Ghana, 1993–1994 (DHS)	15.6	84.4	3.1	31.3	65.6	96.9	3.1	31.3	68.8	12.5	87.5
Indonesia, 1997 (DHS)	25.2	74.8	20.3	57.0	22.7	59.5	40.5	41.2	58.8	66.1	33.9
Kenya, 1998 (DHS)	25.8	74.2	8.0	27.7	64.4	79.0	21.0	10.2	89.8	35.1	64.9
Moldova, 1997 (CDC)*	50.0	50.0	58.3	41.7	0.0	0.0	100.0	33.3	66.7	75.0	25.0
Morocco, 1992 (DHS)	7.3	92.7	4.4	20.4	75.2	95.6	4.4	37.2	62.8	78.8	21.2
Peru, 1996 (DHS)	33.6	66.4	31.1	38.1	30.8	51.0	49.0	60.0	40.0	28.4	71.6
Philippines, 1998 (DHS)	44.8	55.2	37.4	34.6	28.0	31.1	68.9	53.8	46.2	58.2	41.8
Tanzania, 1996 (DHS)	10.0	90.0	1.8	11.3	86.9	98.6	1.4	15.2	84.8	15.0	85.0
Zimbabwe, 1994 (DHS)	3.5	96.5	4.6	25.4	70.0	84.4	15.2	33.3	66.7	83.9	16.1
Users of temporary methods											
Egypt, 1995–1996 (DHS)	21.9	78.1	18.6	50.1	31.3	67.1	32.9	54.3	45.7	67.2	32.8
Ghana, 1993–1994 (DHS)	16.0	84.0	11.0	44.8	44.1	79.7	20.3	50.5	49.5	38.8	61.2
Indonesia, 1997 (DHS)	17.5	82.5	35.8	45.4	18.8	73.8	26.2	29.8	70.2	59.2	40.8
Kenya, 1998 (DHS)	28.5	71.5	19.7	40.0	40.2	60.6	39.4	25.3	74.7	56.1	43.9
Moldova, 1997 (CDC)*	19.2	80.8	73.1	25.0	2.0	0.1	99.9	49.2	50.8	82.3	17.7
Morocco, 1992 (DHS)	14.4	85.6	11.3	34.7	54.0	86.3	13.7	57.2	42.8	90.7	9.3
Peru, 1996 (DHS)	30.7	69.3	35.9	41.3	22.7	46.3	53.7	70.8	29.2	38.4	61.6
Philippines, 1998 (DHS)	24.7	75.3	24.5	45.6	29.9	34.3	65.7	50.5	49.5	51.6	48.4
Tanzania, 1996 (DHS)	27.1	72.9	16.6	30.8	52.6	92.4	7.6	38.3	61.7	57.1	42.9
Zimbabwe, 1994 (DHS)	22.8	77.2	14.3	29.5	56.2	71.9	28.1	37.2	62.8	90.6	9.4
Other nonusers											
Egypt, 1995–1996 (DHS)	29.0	71.0	26.5	34.6	38.9	79.9	20.1	38.7	61.3	45.7	54.3
Ghana, 1993–1994 (DHS)	19.1	80.9	13.8	33.9	52.3	95.7	4.3	28.4	71.6	19.3	80.7
Indonesia, 1997 (DHS)	12.5	87.5	29.5	37.7	32.8	82.2	17.8	27.0	73.0	39.3	60.7
Kenya, 1998 (DHS)	31.9	68.1	17.6	29.8	52.6	82.3	17.7	15.5	84.5	22.7	77.3
Moldova, 1997 (CDC)*	25.6	74.4	74.4	22.6	3.1	0.0	100.0	41.0	59.1	51.0	49.0
Morocco, 1992 (DHS)	20.7	79.3	14.9	28.2	56.9	95.4	4.6	34.9	65.1	49.3	50.7
Peru, 1996 (DHS)	36.9	63.1	36.5	30.2	33.3	65.8	34.2	49.8	50.2	19.2	80.8
Philippines, 1998 (DHS)	23.1	76.9	27.1	35.3	37.7	48.3	51.7	42.6	57.4	29.7	70.3
Tanzania, 1996 (DHS)	23.0	77.0	13.6	26.5	59.9	98.2	1.8	16.6	83.4	12.5	87.5
Zimbabwe, 1994 (DHS)	16.8	83.2	14.5	25.3	60.2	83.4	16.6	22.8	77.2	52.9	47.1

*Data refer to ages 15–44.

categories of potential sterilization users—falling on a crude continuum from most-likely to least-likely candidates—can be identified from the survey data (Rutenberg & Landry, 1993).

The first category consists of women who are in union, are fecund, and want no more children, but who are not currently using a contraceptive method. These women intend to use a contraceptive method in the future, and have stated that sterilization is their preferred method. These women have the greatest potential to adopt sterilization in the near future.

The second category is composed of women who are in union, are fecund, want no more children, and are using either a temporary modern method or a traditional method. The women were not asked about future use of any other method, as they are obviously motivated to control their fertility by using some type of method. Many of these women may switch to sterilization to replace a temporary contraceptive method, or to improve upon a method that they have found to be ineffective.

The third category consists of women who are in union, are fecund, and want no more children, but who are not currently using a contraceptive method and do not intend to use sterilization. The women state that they either intend to use a method other than sterilization or that they do not intend to use any contraceptive method. Although the women in this group are less likely to choose sterilization than those in the other two groups, a great deal can be learned from these women, whose behavior seems contrary to their own expressed interests.

To illustrate the changing profiles of users in countries with increasing sterilization use, we focus the discussion and analysis of data on the characteristics of potential users in 10 selected countries whose sterilization prevalence is projected to increase between 2000 and 2015—Egypt, Ghana, Indonesia, Kenya, Moldova, Morocco, Peru, the Philippines, Tanzania, and Zimbabwe.[3]

The social and demographic characteristics examined in this section parallel those studied in Chapter 3. Data on the age and number of living children of potential users are useful for projecting the demand for sterilization, as well as for estimating demographic impact (Rutenberg & Landry, 1993). Identifying potential users' level of completed schooling is important for designing appropriate educational materials for the intended audience. For example, if literacy is low among potential users, educational materials and strategies to convey sterilization information to a low-literacy audience can be utilized. Information on the residence of potential users is an indicator of where to establish service-delivery points or where to focus outreach efforts and referral systems to increase access. Data on previous use of modern contraceptives is helpful in determining the scope of education and service provision needed to promote the use of temporary methods prior to permanent contraception.

To ascertain whether social and demographic characteristics vary between women with differing propensities to use a permanent method, we examine the characteristics of potential sterilization users in each of the three categories and compare the three groups. The specific characteristics studied include current age (younger than 30 or 30 and older), the number of living children (0–2, 3–4, or five or more), residence (urban or rural), educational level (primary and less or secondary and higher), and previous use of a modern method (ever or never).

Nonusers considering sterilization

As stated earlier, we considered women to be potential sterilization users if they were in union, were fecund, wanted no more children, and were not currently using a contraceptive method, but if they were considering sterilization as their preferred contraceptive method.

[3] Countries with a projected decrease or a plateau in sterilization prevalence are not included in this discussion.

Age

In each country, at least half of women considering sterilization were 30 or older (Table 8.1). Since the median age at sterilization is greater than 30 in all but two of these countries (Moldova, at 27.9, and the Philippines, at 29.6), it is not surprising that the age of potential users approximates that of the median age at sterilization. When we compared current data with those from an earlier study (Rutenberg & Landry, 1993), the proportion of potential users older than 30 increased in countries with a projected rise in sterilization prevalence. This may be due to an increase in contraceptive method choice in these countries, which allows more women to use temporary methods prior to choosing a permanent method.

Number of living children

The number of living children among nonusers considering sterilization varied greatly among countries and regions (Table 8.1). In five countries (Ghana, Kenya, Morocco, Tanzania, and Zimbabwe), more than half of these women had five or more children, while in the remaining five (Egypt, Indonesia, Moldova, Peru, and the Philippines), the majority had four or fewer children. These differences generally reflect differences between the two groups of countries in past fertility levels.

In some countries, the proportion of women with higher numbers of children is greater among those who are considering sterilization than among those who have already been sterilized. This differential was notable in Ghana, Moldova, Tanzania, and Zimbabwe. For example, in Zimbabwe, 70% of women who wanted no more children and were considering sterilization had five or more children, compared with 58% of current sterilization users (not shown).

The opposite pattern can be seen in countries such as Egypt, Indonesia, Peru, and the Philippines, where women who are considering sterilization have fewer children than do those who have already been sterilized. In Egypt, 26% of potential users have 0–2 children, compared with only 4% of current sterilization users. In the Philippines, 37% of potential users have 0–2 children, compared with 13% of current users. While part of the difference in the number of living children between current sterilization users and potential users can be attributed to a general decline in desired family size, some of the difference may be because the number of living children at the time of the survey is an underestimation of the completed fertility of women who may be sterilized in the future (Rutenberg & Landry, 1993).

Educational level

Knowledge of the educational level of potential sterilization users is important in designing information and education messages for the appropriate audience. In several countries (including Egypt, Ghana, Kenya, Morocco, Tanzania, and Zimbabwe), more than 75% of women who wanted no more children and who were considering sterilization had a primary school education or less (Table 8.1). Many of these women were older than 30 at the time of the survey and lived in rural areas. In comparing current users and potential users, educational levels were lower among potential users in Ghana, Peru, Tanzania, and Zimbabwe than among current users (Supplement 3.1 and Table 8.1). In Egypt, Indonesia, Kenya, Moldova, Morocco, and the Philippines, educational levels within the two groups were approximately equivalent.

Residence

When sterilization services are initially introduced, they are generally concentrated in urban areas, where the necessary medical facilities and personnel are often located (Rutenberg & Landry, 1993). As sterilization techniques become simpler and outreach broadens, services are often extended to rural populations. With the exception of Peru and the Philippines, more than half of potential users in each of the selected countries lived in rural areas (Table 8.1).

In countries where rural residence is substantially higher among potential users than among current users, the need for improved access to sterilization in rural areas is great. In Morocco, for example, 63% of women considering sterilization live in rural areas, compared with 37% of current sterilization users. Similar patterns are seen in Egypt, Moldova, and Peru. In countries such as Kenya, sterilization services appear to be relatively accessible to rural populations, since a large proportion of both current and potential users of sterilization live in rural areas.

Ever-use of modern contraceptives

Ever-use of modern contraceptives among potential sterilization users varies widely across countries, as seen in Table 8.1. More than 75% of women considering sterilization in Egypt, Moldova, Morocco, and Zimbabwe have used modern contraceptive methods, while fewer than 30% of potential sterilization users in Ghana, Peru, and Tanzania have ever done so.

There is a notable differential in ever-use of modern methods (other than sterilization) between potential users and current users of sterilization in several of the countries. In Egypt, Indonesia, Moldova, Morocco, the Philippines, and Zimbabwe, the proportion of women who have ever used modern contraceptives is approximately 20% greater among those considering sterilization than among those currently sterilized. For example, 77% of potential users in Egypt have ever used modern methods, compared with 51% of current sterilization users. However, in Ghana, Kenya, Peru, and Tanzania, the proportion of women who have used modern contraceptives is lower among those considering sterilization than among those currently sterilized. In Ghana and Tanzania, for instance, 13% and 15%, respectively, of potential users have ever used modern methods, compared with 22% and 37% of current users. In Peru, this differential was slightly smaller, with 28% of potential users and 42% of current users having ever used modern contraceptive methods.

Users of temporary methods

Women who are in union, are fecund, want no more children, and are using either a temporary modern method or a traditional method may also be potential sterilization users. For most countries, data are not available on these women's intentions to use a permanent method in the future.[4] It is likely that some of these women will switch to sterilization to replace their temporary method after they have reached their desired family size, while others may have already reached their desired family size but are using a less-effective method.

As shown in Table 8.1, on average, users of temporary methods are slightly older and have fewer children than nonusers who are considering sterilization. In each of the selected countries except Peru, more than 70% of users of temporary contraceptive methods are older than 30.

Users of temporary contraceptive methods also appear to be more urban than are nonusers considering sterilization. Levels of previous modern contraceptive use are higher among temporary users. This suggests that urban residence may allow people to gain more information about and greater access to a range of modern contraceptive methods. In addition, women currently using a temporary contraceptive method have a higher level of educational attainment than do nonusers considering sterilization. This may be related to urban residence, and may further explain the women's greater experience with modern contraceptives.

[4] The exception is countries where the CDC has conducted reproductive health surveys. In these countries, all women, regardless of their contraceptive status, were asked about their intention to use other methods (including sterilization) in the future.

Other nonusers

The final category in our examination of potential users consists of women who are in union, are fecund, want no more children, are not currently using a contraceptive method, and do not intend to use sterilization. These women either are considering a method other than sterilization or are not considering any method. If they are sexually active and do not use a contraceptive method, it is likely that many who do not want more children will experience an unintended pregnancy.

There is no consistent trend in age within this category. In seven of the 10 countries, more than 20% of women are younger than 30 (Table 8.1) and presumably have several years of fertility ahead. In Ghana, Kenya, Morocco, Tanzania, and Zimbabwe, women in this category have fewer living children than nonusers considering sterilization. In Indonesia, Peru, and the Philippines, the opposite pattern is found, with greater numbers of living children among women in this category. Finally, women not using a method and not considering sterilization are more likely to live in rural areas, have the lowest levels of education, and have the least amount of previous modern contraceptive use.

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Supplement 8.1. Continuum of risk of unintended pregnancy, by level of risk, according to individuals' characteristics and needs associated with each level of risk

	Low risk		Moderate risk	High risk	Very high risk
Characteristics of individuals in each risk category	• Users of permanent methods	• Users of modern temporary methods—correct use • Users of traditional methods—correct use	• Users or partners who are dissatisfied with current method • Users or partners who are using modern or traditional methods incorrectly • Users or partners who are using highly ineffective methods	• Women who are currently not using a method but who have used one in the past and who state that they intend to use one in the future • Women who are not using a method but who have used one in the past and who do not know if they will use one in the future • Women who have never used a method but who state that they intend to use one in the future	• Women who have never used a method and who do not know if they will use one in the future • Women who have never used a method and who state that they do not intend to use one in the future
Needs of each risk category	• Continuing reproductive health services	• Continuing reproductive health services, including resupply of contraceptives, information, and support	• Higher quality reproductive health services (especially better counseling and management of side effects) • Research into the causes of dissatisfaction and method choice beyond service-delivery factors	• Research into the causes of nonuse and programs to address those causes (which often are not related to service delivery) • Better postpartum programs • Information, education, communication, and counseling	

Source: Adapted from Yinger, 1998.

Supplement 8.2. Projected percentage and number of women using sterilization in selected developing countries, by region, according to year

	2000		2005		2010		2015	
Country	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**
Asia		**159,890**		**161,411**		**156,049**		**141,707**
Afghanistan	1.0	41	1.6	84	2.1	127	2.7	183
Bangladesh	7.8	2,137	6.9	2,141	6.0	1,982	4.9	1,747
Bhutan	0.3	1	1.2	4	2.3	9	3.6	17
Cambodia	2.2	178	4.5	243	7.1	318	10.3	405
China, People's Republic of	31.2	77,974	28.8	74,536	26.4	69,709	24.2	62,620
China, Republic of (Taiwan)	24.2	743	24.5	920	24.8	1,100	25.1	1,256
Hong Kong	23.2	259	24.4	274	25.6	271	26.8	261
India	34.0	63,870	31.5	66,537	27.6	64,429	22.3	56,114
Indonesia	3.6	1,397	4.4	1,825	4.9	2,166	5.4	2,442
Iran	10.7	1,375	9.0	1,326	7.1	1,168	5.2	896
Korea, Democratic People's Republic of	23.4	1,001	23.8	1,065	24.0	1,110	24.2	1,144
Korea, Republic of	27.2	2,248	26.3	2,180	25.4	2,034	24.5	1,877
Laos	5.6	44	7.7	70	9.8	104	11.9	145
Malaysia	9.0	307	7.9	299	6.6	274	5.1	227
Mongolia	20.6	96	21.9	118	22.5	131	22.8	138
Myanmar	7.9	857	13.2	1,279	16.7	1,538	18.5	1,681
Nepal	13.7	621	13.8	722	14.1	839	14.6	970
Pakistan	6.4	1,603	5.4	1,569	4.5	1,507	3.6	1,372
Papua New Guinea	10.0	74	12.1	102	14.3	136	16.7	177
Philippines	11.2	1,303	14.7	1,988	18.3	2,716	21.5	3,477
Singapore	19.2	111	20.6	117	22.2	122	24.2	126
Sri Lanka	24.8	771	24.7	801	24.1	794	23.5	780
Thailand	18.4	1,983	17.6	1,984	16.7	1,891	15.8	1,764
Vietnam	6.6	896	8.1	1,227	9.7	1,574	11.2	1,888
Latin America and the Caribbean		**25,413**		**27,512**		**29,203**		**30,424**
Argentina	20.0	1,160	21.0	1,294	21.8	1,423	22.5	1,547
Bolivia	5.9	74	10.4	161	14.9	260	19.2	377
Brazil	39.4	12,893	38.9	13,578	38.7	14,043	38.7	14,299
Chile	20.9	471	21.4	511	21.9	541	22.3	564
Colombia	25.7	1,951	24.9	2,049	24.1	2,126	23.2	2,154
Costa Rica	20.0	150	21.5	179	22.9	206	24.4	231
Cuba	22.8	430	23.7	451	24.5	466	25.4	451
Dominican Republic	40.9	640	35.0	597	28.6	519	22.1	415
Ecuador	21.0	438	21.6	500	21.9	553	22.0	595
El Salvador	33.6	416	29.8	408	25.5	384	20.9	343
Guatemala	16.4	303	16.3	352	16.1	406	15.6	458
Guyana	22.0	37	22.6	40	22.7	41	22.8	41
Haiti	4.5	63	6.7	106	8.9	155	11.0	210
Honduras	19.5	207	20.4	254	20.8	300	20.9	340
Jamaica	14.0	72	17.0	93	20.1	114	23.1	134
Mexico	22.9	4,013	23.0	4,386	22.8	4,643	22.4	4,788

(cont'd.)

Supplement 8.2. Projected percentage and number of women using sterilization in selected developing countries, by region, according to year *(cont'd.)*

Country	2000		2005		2010		2015	
	%	N (in 1,000s)	%	N (in 1,000s)	%	N (in 1,000s)	%	N (in 1,000s)
Latin America and the Caribbean *(cont'd.)*								
Nicaragua	26.8	238	27.7	284	27.9	333	27.5	376
Panama	36.5	191	32.2	183	27.6	167	22.8	143
Paraguay	7.8	70	11.5	119	15.3	178	19.0	247
Peru	10.6	454	14.8	700	18.8	966	22.7	1,235
Puerto Rico	43.5	277	37.1	240	30.2	198	23.7	157
Trinidad and Tobago	12.9	35	17.3	49	21.4	61	25.5	71
Uruguay	21.2	102	21.7	109	22.2	114	22.6	120
Venezuela	18.1	728	19.4	869	20.6	1,006	21.7	1,128
Middle East and North Africa		**1,557**		**2,145**		**2,745**		**3,355**
Algeria	1.5	70	2.7	144	3.9	232	5.1	327
Egypt	1.5	147	2.0	232	2.3	320	2.6	395
Iraq	2.5	82	2.9	114	3.3	151	3.8	195
Jordan	4.4	39	4.6	48	4.8	57	4.8	67
Kuwait	3.2	10	3.9	14	4.6	18	5.0	21
Lebanon	4.7	28	5.0	32	5.1	34	5.1	36
Libya	14.1	127	16.9	177	19.7	230	22.0	288
Morocco	3.6	150	4.3	197	4.8	230	5.0	255
Oman	7.0	24	5.8	25	4.6	24	3.3	20
Saudi Arabia	2.0	57	2.5	87	3.0	125	3.6	174
Sudan	1.7	83	2.1	112	2.5	149	2.9	195
Syria	2.7	68	3.3	103	4.0	142	4.7	185
Tunisia	14.9	217	11.9	190	8.6	144	5.1	89
Turkey	3.3	413	4.3	577	5.2	737	6.0	886
United Arab Emirates	4.1	15	4.4	18	4.8	21	5.0	24
Yemen	1.1	27	2.5	75	3.6	131	4.5	198
Sub-Saharan Africa		**3,147**		**6,553**		**11,000**		**16,765**
Angola	2.4	44	4.3	91	6.1	155	8.0	237
Benin	1.0	15	3.6	62	6.3	124	9.1	204
Botswana	6.9	14	10.8	24	14.7	36	18.5	51
Burkina Faso	0.7	19	1.3	41	1.9	71	2.6	111
Burundi	0.7	8	3.1	43	5.7	90	8.3	150
Cameroon	2.0	87	4.2	210	6.5	372	9.0	586
Central African Republic	1.0	8	3.4	32	5.9	61	8.6	100
Chad	0.3	5	0.7	13	1.3	26	1.9	46
Congo	4.4	17	6.2	27	8.0	42	9.8	60
Côte d'Ivoire	1.0	35	4.8	189	8.7	390	12.9	657
Eritrea	1.3	9	4.6	36	8.0	72	11.5	120
Ethiopia	0.7	91	1.8	252	3.1	504	4.6	876
Gabon	6.8	12	8.7	17	10.6	24	12.5	32
Gambia	1.2	3	3.5	12	5.9	22	8.4	36
Ghana	1.8	62	4.9	256	8.0	484	11.2	773

(cont'd.)

Supplement 8.2. Projected percentage and number of women using sterilization in selected developing countries, by region, according to year *(cont'd.)*

Country	2000		2005		2010		2015	
	%	N (in 1,000s)	%	N (in 1,000s)	%	N (in 1,000s)	%	N (in 1,000s)
Sub-Saharan Africa *(cont'd.)*								
Guinea	6.4	69	8.6	106	10.7	151	12.8	206
Guinea-Bissau	5.5	10	7.2	14	8.9	20	10.7	27
Kenya	6.7	338	8.5	492	10.0	648	11.6	826
Lesotho	9.1	47	10.5	60	12.0	76	13.5	97
Liberia	2.3	30	3.4	41	4.7	63	6.1	95
Madagascar	1.6	49	4.1	143	6.7	275	9.4	449
Malawi	4.1	84	8.5	199	12.7	346	16.4	521
Mali	0.6	15	1.0	32	1.5	56	2.0	90
Mauritania	1.0	4	1.3	6	1.7	9	2.0	12
Mauritius	8.2	20	13.5	34	18.8	49	24.2	61
Mozambique	1.0	50	1.9	104	3.0	179	4.3	288
Namibia	9.3	19	10.8	24	12.3	30	13.8	37
Niger	0.5	11	2.4	61	4.3	133	6.4	231
Nigeria	1.2	373	3.1	1,165	5.2	2,201	7.4	3,562
Rwanda	1.9	22	6.6	90	11.3	175	15.7	276
Senegal	1.0	18	2.9	64	5.0	127	7.2	212
Sierra Leone	4.4	32	6.2	51	8.0	74	9.8	103
Somalia	1.1	16	2.6	44	4.4	88	6.2	149
South Africa	13.1	1,012	14.2	1,151	15.1	1,275	16.0	1,403
Swaziland	5.4	11	7.9	18	10.5	28	13.1	39
Tanzania	2.6	173	4.4	344	6.3	563	8.2	845
Togo	1.1	12	4.6	60	8.1	124	11.6	206
Uganda	2.3	98	6.0	307	10.1	621	13.8	1,017
Zaire (Democratic Republic of Congo)	0.8	78	2.5	292	4.2	600	6.1	1,040
Zambia	3.0	47	6.4	116	9.8	207	13.3	325
Zimbabwe	3.8	80	10.0	230	16.3	409	22.3	609

Note: Includes all developing countries with a population of more than 1 million. Sterilization prevalence is the percentage of women aged 15–49 currently married or living in union who are currently using sterilization. Numbers of users include women not married or in union in countries where there is substantial use of sterilization among such women.

Supplement 8.3. Projected percentage and number of men using vasectomy in selected developing countries, by region, according to year

	2000		2005		2010		2015	
Country	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**
Asia		**33,383**		**29,754**		**24,871**		**18,678**
Afghanistan	0.1	3	0.1	6	0.1	8	0.2	12
Bangladesh	1.1	303	0.9	266	0.6	199	0.3	117
Bhutan	0.1	0	0.1	0	0.1	0	0.1	0
Cambodia	0.1	12	0.3	20	0.5	31	0.7	44
China, People's Republic of	8.9	22,345	7.1	18,262	5.2	13,646	3.3	8,546
China, Republic of (Taiwan)	1.5	48	2.2	82	2.8	126	3.5	175
Hong Kong	1.1	12	2.0	22	2.9	31	3.9	38
India	4.2	7,970	4.0	8,395	3.5	8,246	2.9	7,320
Indonesia	0.8	294	0.6	267	0.5	212	0.3	147
Iran	1.1	147	0.9	132	0.6	103	0.3	60
Korea, Democratic People's Republic of	3.1	134	3.2	144	3.3	151	3.3	156
Korea, Republic of	10.6	879	8.3	686	5.9	469	3.4	258
Laos	0.2	1	0.4	4	0.7	7	0.9	12
Malaysia	0.3	9	0.3	11	0.3	13	0.3	15
Mongolia	2.6	12	2.8	15	2.9	17	3.0	18
Myanmar	2.8	382	3.0	373	2.9	294	2.1	201
Nepal	5.8	263	4.3	224	2.9	169	1.4	94
Pakistan	0.1	29	0.2	44	0.2	65	0.2	92
Papua New Guinea	0.7	5	1.0	9	1.4	13	1.8	19
Philippines	0.3	31	1.1	142	1.9	278	2.7	429
Singapore	0.7	4	1.4	8	2.3	13	3.3	17
Sri Lanka	3.9	120	3.7	119	3.4	113	3.2	105
Thailand	2.6	283	2.6	293	2.6	291	2.5	284
Vietnam	0.6	97	1.4	230	2.1	376	2.8	519
Latin America and the Caribbean		**1,712**		**2,153**		**2,615**		**3,085**
Argentina	2.4	142	2.6	164	2.8	183	3.0	203
Bolivia	1.2	16	1.6	24	1.9	33	2.3	44
Brazil	2.6	889	2.5	941	2.5	978	2.5	1,000
Chile	2.6	59	2.7	65	2.8	70	2.9	74
Colombia	0.9	66	1.6	134	2.3	211	3.1	293
Costa Rica	1.4	11	2.1	17	2.7	24	3.3	31
Cuba	3.5	66	3.5	67	3.5	67	3.6	63
Dominican Republic	0.3	4	1.1	20	2.0	37	2.9	54
Ecuador	2.0	42	2.3	53	2.6	65	2.9	76
El Salvador	0.6	7	1.3	17	2.0	28	2.6	42
Guatemala	1.7	32	1.7	37	1.7	42	1.6	48
Guyana	2.8	5	2.9	5	3.0	5	3.0	5
Haiti	0.3	4	0.5	8	0.6	11	0.8	16
Honduras	0.4	4	1.1	13	1.9	26	2.6	41
Jamaica	2.7	14	2.8	15	3.0	17	3.1	18
Mexico	1.1	192	1.7	326	2.3	471	2.9	619

(cont'd.)

Supplement 8.3. Projected percentage and number of men using vasectomy in selected developing countries, by region, according to year *(cont'd.)*

	2000		2005		2010		2015	
Country	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**	**%**	**N (in 1,000s)**
Latin America and the Caribbean *(cont'd.)*								
Nicaragua	0.7	6	1.6	15	2.6	29	3.6	47
Panama	0.6	3	1.4	8	2.2	13	3.0	19
Paraguay	1.4	14	1.7	19	2.0	25	2.2	32
Peru	0.4	17	1.3	61	2.1	113	3.0	168
Puerto Rico	3.4	22	3.4	22	3.3	22	3.2	21
Trinidad and Tobago	0.5	1	1.5	4	2.6	7	3.6	10
Uruguay	2.7	13	2.8	14	2.9	15	3.0	16
Venezuela	2.1	83	2.3	104	2.6	123	2.8	145
Middle East and North Africa		**132**		**174**		**212**		**254**
Algeria	0.3	13	0.3	16	0.3	19	0.3	22
Egypt	0.3	27	0.3	36	0.3	44	0.3	50
Iraq	0.2	5	0.2	8	0.2	10	0.3	13
Jordan	0.3	2	0.3	3	0.3	4	0.3	4
Kuwait	0.2	0	0.3	1	0.3	1	0.3	1
Lebanon	0.3	2	0.3	2	0.3	2	0.3	2
Libya	1.3	12	1.9	19	2.4	28	2.9	37
Morocco	0.2	10	0.3	13	0.3	16	0.3	18
Oman	0.1	0	0.2	0	0.2	1	0.2	1
Saudi Arabia	0.1	4	0.2	6	0.2	8	0.2	12
Sudan	0.1	4	0.1	7	0.2	9	0.2	13
Syria	0.2	6	0.3	8	0.3	10	0.3	12
Tunisia	0.3	5	0.3	5	0.3	6	0.3	6
Turkey	0.3	39	0.3	43	0.3	46	0.3	48
United Arab Emirates	0.3	1	0.3	1	0.3	1	0.3	2
Yemen	0.1	2	0.2	6	0.2	7	0.3	13
Sub-Saharan Africa		**298**		**528**		**819**		**1,171**
Angola	0.1	2	0.2	4	0.3	7	0.4	10
Benin	0.0	0	0.2	3	0.3	7	0.5	11
Botswana	0.5	2	1.1	4	1.6	7	2.2	10
Burkina Faso	0.1	2	0.1	3	0.1	5	0.2	7
Burundi	0.1	1	0.2	3	0.3	4	0.4	7
Cameroon	0.1	5	0.2	12	0.4	21	0.5	32
Central African Republic	0.1	1	0.2	2	0.3	3	0.4	5
Chad	0.0	0	0.1	1	0.1	2	0.1	3
Congo	0.1	0	0.3	1	0.5	2	0.6	4
Côte d'Ivoire	0.2	5	0.5	18	0.8	35	1.1	57
Eritrea	0.2	1	0.4	3	0.6	6	0.9	9
Ethiopia	0.1	10	0.1	12	0.1	15	0.1	19
Gabon	0.2	0	0.5	1	0.8	2	1.1	3
Gambia	0.0	0	0.2	1	0.3	1	0.4	2
Ghana	0.1	6	0.4	19	0.6	36	0.8	57

(cont'd.)

Supplement 8.3. Projected percentage and number of men using vasectomy in selected developing countries, by region, according to year *(cont'd.)*

Country	2000		2005		2010		2015	
	%	N (in 1,000s)	%	N (in 1,000s)	%	N (in 1,000s)	%	N (in 1,000s)
Sub-Saharan Africa *(cont'd.)*								
Guinea	0.2	2	0.5	6	0.8	11	1.1	18
Guinea-Bissau	0.1	0	0.3	1	0.5	1	0.7	2
Kenya	0.6	34	0.8	52	0.9	70	1.1	91
Lesotho	0.5	3	0.7	4	1.0	6	1.2	9
Liberia	0.1	0	0.1	1	0.1	2	0.1	2
Madagascar	0.1	4	0.3	9	0.4	17	0.5	26
Malawi	0.2	4	0.7	17	1.3	33	1.8	53
Mali	0.0	1	0.1	2	0.1	4	0.1	6
Mauritania	0.0	0	0.0	0	0.1	1	0.1	1
Mauritius	0.4	1	1.4	3	2.3	6	3.3	8
Mozambique	0.1	5	0.1	5	0.1	6	0.1	7
Namibia	0.3	1	0.6	2	0.9	4	1.3	5
Niger	0.1	2	0.1	3	0.1	4	0.2	6
Nigeria	0.1	35	0.2	60	0.2	93	0.3	135
Rwanda	0.2	3	0.7	9	1.2	18	1.6	28
Senegal	0.1	2	0.2	3	0.2	5	0.3	8
Sierra Leone	0.1	1	0.3	2	0.5	4	0.6	7
Somalia	0.1	1	0.1	2	0.1	2	0.1	3
South Africa	1.6	126	2.0	160	2.3	194	2.6	229
Swaziland	0.4	1	0.6	2	0.9	2	1.1	4
Tanzania	0.1	8	0.2	18	0.4	32	0.5	48
Togo	0.1	1	0.3	4	0.6	9	0.9	16
Uganda	0.2	7	0.5	27	0.9	56	1.3	94
Zaire (Democratic Republic of Congo)	0.1	10	0.1	12	0.1	16	0.1	21
Zambia	0.2	3	0.5	9	0.8	18	1.2	29
Zimbabwe	0.4	8	1.2	28	2.1	52	2.9	79

Note: Includes all developing countries with a population of more than 1 million. Sterilization prevalence is the number of male sterilization users as a percentage of women aged 15–49 who are currently married or living in union. Numbers of users include male partners of women aged 15–49 who are unmarried or not in union, in countries where there is substantial use of sterilization among such couples. Information on vasectomy was obtained from female partners who answered the survey.

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