Voluntary Female Sterilization is the world's most widely used family planning method and one of the fastest growing. An estimated 138 million women of reproductive age use this method today—43 million more than in 1984. Millions more are expected to ask for the method in the next decade.

Female sterilization involves blocking the tubes that carry eggs from the ovaries to the uterus. There are two ways to reach the tubes. Minilaparotomy consists of making a small incision in the abdomen, moving each tube to the incision, ligating (tying) each tube, and removing a segment of tube. Laparoscopy consists of inserting a laparoscope, a thin tubular instrument, into the abdomen through a small incision. Through the laparoscope, the surgeon sees the tubes and usually applies clips, rings, or heat to block them. Both these methods are very effective and very safe.

The major reason for the growth of voluntary female sterilization in developing countries is expanding services. When services become available, women use them and tell others about them. Kenya is a prominent example. Female sterilization has become the most widely used contraceptive method among women over age 30. In 1990 more than 11,000 procedures were performed by the major network of providers. But just a few years ago female sterilization was almost unheard of. The rapid expansion of safe, efficient, and convenient services, resulting from a commitment to family planning, has contributed significantly to the growth of voluntary female sterilization.
Voluntary female sterilization is safe and effective. It is appropriate for women who are certain that they want no more children. More and more women are finding that voluntary sterilization is right for them. As one Kenyan woman said, "This is the only way to make sure we can plan our future."

To meet this challenge, they can:

- Provide clear, accurate information through all channels of communication including the mass media. Couples need to know about sterilization long before they finally decide to use it. Satisfied clients often are the best promoters of voluntary sterilization, but the method also should be discussed in mass-media campaigns about family planning and in all family planning counseling, outreach, and other communication. People have a right to know about this safe and effective family planning method.

- Provide all sterilization clients with informative, objective, and empathetic counseling. Because sterilization is intended to end fertility permanently, providers must pay special attention to counseling sterilization clients. The client must clearly understand the benefits, risks, and irreversible nature of the procedure. She must be screened and counseled to minimize the possibility that she might later regret her sterilization. And she must be able to choose without any coercion whether to undergo sterilization, based on an accurate understanding of the procedure.

- Perform voluntary sterilization under local anesthesia. Using local anesthesia rather than general minimizes the major risk of sterilization—complications of anesthesia. Minilaparotomy under local anesthesia can be performed in various settings, by various trained providers, and with simple instruments. It usually takes 10 to 20 minutes, and women can leave the clinic in a few hours. Laparoscopy also can be performed under local anesthesia. It is even quicker but needs to be done by an experienced surgeon in a hospital.

- Offer sterilization in as many places and for as many women as possible. Clinics, hospitals, mobile units, and temporary facilities should provide services. Services should be available when women give birth and at any other time. Rigid criteria for eligibility should be dropped.

- Train, monitor, and supervise all personnel. Providing widely available, high-quality services requires the skills of many health professionals. Some of these skills, whether in surgery or in counseling, are not routinely taught in medical or nursing schools. Special training is needed, followed by regular monitoring and supervision. Voluntary female sterilization is safe and effective. It is appropriate for women who are certain that they want no more children. More and more women are finding that voluntary sterilization is right for them. As one Kenyan woman put it, "We are all on our way to TL (tubal ligation)."
Most Widely Used Method

Voluntary female sterilization is the number one method of family planning in the world. An estimated 138 million women currently are protected from unwanted pregnancy by voluntary female sterilization, according to estimates based on surveys and service statistics (see Table 1). These 138 million women account for about 16% of all married women of reproductive age. Female sterilization is the most widely used contraceptive method in at least 20 countries (14). Without fuss or fanfare, the number of women relying on voluntary sterilization has risen sharply over the past decade. The current figure is 45% higher than the 1984 Population Reports estimate of about 95 million (91). And, compared with 16% of married women of reproductive age currently relying on female sterilization, an estimated 12% did so in 1984.

Most of the increase in numbers has occurred where female sterilization has long been widespread—Latin America, Asia, and the US. According to Population Reports estimates, in Latin America those sterilized increased from about 14% of married women of reproductive age in 1984 to 17% in 1990; in Asia, from 17% to 22%. In the US a 1988 survey reported 23% of married women of reproductive age sterilized compared with 17% in a 1982 survey (100, 115).

The rapid spread of voluntary female sterilization has not been limited to a few countries or a few dramatic program efforts. Although there are still many countries where services are difficult to obtain, major increases in use have taken place in countries as diverse as China, the Dominican Republic, El Salvador, India, Mexico, Nepal, Paraguay, the Philippines, Trinidad and Tobago, Tunisia, South Korea, and the US (see Figure 1). Thus voluntary female sterilization is common in countries where women marry very young—such as Bangladesh and India—and where women marry in their early 20s—the Philippines and South Korea—as well as in countries where women are not formally married at all—the Dominican Republic, and Trinidad and Tobago. Further, these countries include predominantly Hindu, Islamic, and Catholic Christian populations.

Also, these countries represent a wide variety of delivery systems for female sterilization services. For example, in the US, private physicians perform most tubal ligations; payment usually comes from the couple themselves or from employment-based health insurance. In Brazil many women undergo cesarean sections so that health insurance will cover sterilization procedures performed at the same time (74, 119). In Kenya a variety of public and private providers have rapidly expanded services in the last few years (see pp. 12-13). Wherever sterilization services are available, women tend to use them in increasing numbers. Where sterilization is not used, a major reason is lack of services or restrictive regulations.

Why is female sterilization spreading so quickly? There are many reasons:

- Women find it an effective, convenient, and safe way to protect themselves from unwanted pregnancy; it requires no supplies; no further action is needed once the procedure has been performed; and there are no long-term side effects;
- Minilaparotomy with local anesthesia has made female sterilization available in more settings and from more providers; minilaparotomy also allows women to choose between interval and postpartum procedures;
- Government and donor support for family planning is increasing;
- Age and parity requirements for sterilization clients have been eliminated or liberalized in many countries (121);
- Couples are choosing to have fewer children and to complete their families at younger ages (14, 122);
- Use of all modern methods is growing as family planning becomes a social norm in many countries.

In short, where the services become available, women use them. The main opposition to female sterilization comes from some policymakers, religious leaders, and physicians. While this opposition may be well-intentioned—to protect women from ending childbearing in cultures where fertility is highly valued—it may be directly contrary to the wishes of the women themselves.

Although widespread, increases in the use of voluntary female sterilization are not uniform. In most of the Near East and Africa the prevalence of female sterilization has increased little over the past 10 years. Most of these countries services are very limited or nonexistent.

Surveys in a few of these countries, however, suggest that change is starting. In Kenya the prevalence of voluntary sterilization is increasing. In most of the Near East and Africa the prevalence of female sterilization has increased little over the past 10 years. In most of these countries services are very limited or nonexistent.

After your family is complete, consider...

BILATERAL TUBAL LIGATION

SAFE & PERMANENT family planning for women

Quick, easy, safe, and effective—this is what makes voluntary female sterilization the most widely used family planning method.
female sterilization has doubled since 1984, reaching 5% of mar-
ried women of reproductive age in 1989 (80). In China and Tur-
key also, the prevalence of vol-
untary female sterilization
appears to be rising from very
low levels (58, 63).

### Table 1

<table>
<thead>
<tr>
<th>Region</th>
<th>% of MWRA (in thousands)</th>
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</tr>
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<td>United States</td>
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</tr>
<tr>
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</tbody>
</table>

**MWRA** = married women of reproductive age

Figure 1. Changes in Prevalence of Voluntary Female Sterilization Among Married Women of Reproductive Age (MWRA), Survey Results in Selected Countries.

In Latin America the prevalence of female sterilization is
high and rising fast. Voluntary female sterilization is
the most widely used method in at least eight countries in the

Asia

Voluntary female sterilization is a major family planning method
in many countries in Asia. It is the most used method in Bang-
ladesh, Fiji, India, Nepal, the Philippines, Sri Lanka, Taiwan,
and Thailand (14). South Korea has the highest reported preva-
ience in the world, 37% of mar-
ried women of reproductive age in 1988 (64) (see Table 2). This is
a 60% increase over the 1982
level (139). In China the govern-
ment reported that in 1989 30% of
married women of reproduc-
tive age—61 million—were relying on female steriliza-
tion. Female sterilization is a close second to the intra-
terine device (IUD), used by 34% (6). A 1985 survey had
reported that 27% were sterilized (138). About one-quar-
ter of married women of reproductive age in both Taiwan
and Sri Lanka have chosen the procedure (14, 132). In the
Philippines prevalence levels more than doubled in a
decade, reaching 11% by 1986 (91, 138).

Government support for sterilization services has been

![Figure 1](https://via.placeholder.com/150)

**Figure 1.** Changes in Prevalence of Voluntary Female Sterilization Among Married Women of Reproductive Age (MWRA), Survey Results in Selected Countries.

**Source:** Contraceptive Prevalence and Demographic and Health Surveys

**POPULATION REPORTS**
A 1986 survey in the Dominican Republic recorded the highest level reported in the region—33%—compared with 21% in 1980 and 12% in 1973 (13, 14, 15). El Salvador and Brazil reported prevalence rates of 30% in 1988 and 27% in 1986, respectively (31, 138). In Colombia use of female sterilization tripled between 1978 and 1986, rising to cover 18% of married women of reproductive age. Female sterilization replaced oral contraceptives as the leading family planning method among married women in Colombia (39, 138). One reason for high sterilization rates in some Latin American countries is that so many women want no more children—70% of married women of reproductive age in Colombia, for example, and 69% in El Salvador. The average age at female sterilization in El Salvador is 28; average parity, 3.5; and widespread use of the method is the major reason for continuing fertility decline (31).

In Latin America, as elsewhere, availability makes a big difference. For example, in Mexico, where 19% of married women of reproductive age told a 1987 survey that they were sterilized, the procedure is provided free on request in government clinics and hospitals. There are no age, parity, or spousal consent requirements. In El Salvador 90% of women who have heard of voluntary sterilization know where to obtain the procedure (1, 14, 141). In some places where governments do not provide female sterilization, family planning associations offer financial arrangements that make female sterilization affordable. In Colombia, for example, the private Asociación Pro-Bienestar de la Familia de Colombia (PROFAMILIA) performs nearly three-quarters of all female sterilizations. Charges are low and based on ability to pay. In Guatemala, where both the government and the private Asociación Pro-Bienestar de la Familia de Guatemala (APROFAM) are major providers, APROFAM also charges on a sliding scale (77).

In some Latin American countries female sterilization has become widespread despite age and parity restrictions. While not law, these restrictions are common clinical practice and can obstruct a woman’s access to the procedure (61). For example, in the Dominican Republic a range of age and parity requirements exist, mandating a parity of six children for women age 25 to a parity of one for women age 40 or older. In Guatemala parity requirements are more relaxed—a minimum of three children at age 25, up to no minimum parity at age 35 or older. Peru has some of the most severe restrictions. Sterilization is legal only to save the life of the woman, requires approval of a committee, and must be performed by a physician in a hospital (77). As a result prevalence is low for the region. It stood at 6% in 1986.

Near East and North Africa

Most Near Eastern and North African countries have levels of female sterilization under 5%. Tunisia is the obvious exception. The national family planning program began offering voluntary female sterilization free of charge in the early 1970s. For example, in the Dominican Republic a range of age and parity requirements exist, mandating a parity of six children for women age 25 to a parity of one for women age 40 or older. In Guatemala parity requirements are more relaxed—a minimum of three children at age 25, up to no minimum parity at age 35 or older. Peru has some of the most severe restrictions. Sterilization is legal only to save the life of the woman, requires approval of a committee, and must be performed by a physician in a hospital (77). As a result prevalence is low for the region. It stood at 6% in 1986.
Coordinated efforts to increase the availability of voluntary female sterilization and to demonstrate its appropriateness can bring a change, as the case of Kenya illustrates (7) (see pp. 12-13). In most countries, however, services are very limited, few physicians have been trained to perform the procedure, and family planning programs promote family planning only for spacing purposes, without mention of limiting family size. This is the case in Zaire, where the procedure often still involves general anesthesia and a hospital stay (36). Such approaches on the part of family planning programs reflect long-standing perceptions that people fear sterility, want large families, and would object to family planning if they thought it meant limiting childbearing. Restrictive age and parity requirements are still the rule in much of Africa (77). In Niger, for example, a woman must be over 35 years of age and have at least four living children.

### Table 2

**Reliance on Female Sterilization Among Currently Married Women of Reproductive Age**

As Reported in Most Recent Representative Sample Surveys in Selected Countries, 1985–1990

<table>
<thead>
<tr>
<th>Region &amp; Country</th>
<th>Ref. No.</th>
<th>Year</th>
<th>% Using Female Sterilization</th>
<th>% Using Any Method</th>
<th>% of Contraceptors Using Female Sterilization</th>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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she also must obtain her husband’s consent (4). In Senegal a woman must be over 35 and have at least six children (73). Among developed countries voluntary female sterilization is most popular and fastest growing in the US. A 1988 survey reported that 2% of married women of reproductive age, or 6.8 million women, had been sterilized for contraceptive purposes was legalized only in 1990, and use of all modern methods remains slight because they are difficult to obtain (45).

Future Demand for Services
An estimated 123 million women in developing countries are now sterilized. If services are available, this number will increase rapidly in the 1990s. It has been estimated that by the year 2000 another 47 million women will want to be sterilized (43).

The demand for female sterilization services is expected to increase in every region. In the developing world the greatest increase is expected in Latin America. For example, conservative estimates based on Demographic and Health Surveys data indicate that more than 2.5 million Brazilian women, 350,000 women in Colombia, and 164,000 women in the

Approval of Voluntary Sterilization Growing in Islamic Countries
Voluntary female sterilization is already widely used in some Islamic countries, and recent policy pronouncements will help make the method more available in a number of others. In general, the opinion seems to be spreading that the Islamic religion accepts voluntary sterilization as a family planning method.

Voluntary female sterilization is a major family planning method in Bangladesh, Jordan, and Tunisia. Tunisia in 1985 had the highest reported prevalence of voluntary female sterilization among Islamic countries, at 12% of married women of reproductive age, or about one-sixth of all family planning users (29). The most recent survey in Bangladesh, conducted in 1985, found that 8% of married women of reproductive age relied on voluntary female sterilization. These women accounted for one-quarter of all family planning users (138). In 1985 Jordan’s 5% prevalence rate accounted for about one-sixth of all contraceptors (138). Bangladesh and Tunisia have long offered voluntary female sterilization in their national family planning programs. In Jordan use increased in the mid-1980s when public sterilization services became more available (144). Pakistan, which has offered sterilization services sporadically since the 1970s, currently offers voluntary female sterilization on a small scale in its national program. It is available in most large cities through various nongovernmental organizations, however, and demand appears to be increasing (96).

In some other countries questions about Islam’s view of voluntary sterilization have limited services. Indonesia has no central authority on the interpretation of religious law. The

Lack of services explains lower prevalence in some other developed countries. In Sweden only 6% of married couples of reproductive age rely on sterilization, male or female. Health care authorities give sterilization services low priority, and a wait of a year or more to obtain a sterilization procedure is common (6). In some Eastern European countries services are inadequate or not available at all. In Romania, for example, female sterilization for contraceptive purposes was legalized only in 1990, and use of all modern methods remains slight because they are difficult to obtain (45).

In Indonesia Islamic leaders recently agreed that female sterilization is an acceptable form of contraception (3, 77). They declared that “sterilization should be widely implemented only after considering medical, psychological and social factors, with the understanding that the sterilization does not represent a permanent loss of fertility, since the possibility for pregnancy exists” (102). This announcement was made just before the International Congress on Islam and Population Policy held in 1990 in Jeddah. At the Congress representatives of 29 countries recommended that immediate action be taken to coordinate contraception and reeducation programs toward population issues. The Congress also recommended that countries endorse safe and effective contraceptive methods that are not antagonistic to Islamic teaching. The Congress did not single out voluntary sterilization or any other method for disapproval (81).
Dominican Republic are not currently using contraception but plan to use sterilization in the future (10, 39, 77, 145). In Asia and the Near East also, demand is expected to increase, although not as rapidly as in Latin America. Over 700,000 women in Thailand, 450,000 women in Indonesia, and 248,000 women in Tunisia not currently using contraception plan to use sterilization in the future (9, 34, 72, 77).

In addition—but not addressed in these surveys—there are many other women currently using other contraceptive methods who can be expected to want sterilization when they complete their families.

The demand for sterilization in Africa also is expected to increase, although in much smaller numbers. Various countries, including Ghana, Kenya, Madagascar, Nigeria, Tanzania, Uganda, and Zimbabwe, have recently incorporated voluntary sterilization services into their family planning programs (14). Demographic and Health Surveys indicate that over 311,000 women in Kenya and 71,000 women in Zimbabwe who are not currently using contraception plan to use sterilization in the future (77, 80, 154).

### Glossary of Voluntary Female Sterilization

#### Anastomosis
Reconnection of the severed ends of the fallopian tube after sterilization. Anastomosis occasionally occurs spontaneously, allowing pregnancy to occur.

#### Ectopic pregnancy
Implantation of a fertilized ovum outside the uterine cavity.

#### Electrocoagulation
The use of heat generated by electric current to coagulate and block the fallopian tubes. Usually performed via laparoscopy.

#### Inflation (or pneumoperitoneum)
Introduction of the abdomen with 1 to 3.5 liters of gas to separate the abdominal wall from the abdominal organs. This allows for the safe introduction of the laparoscope and better visibility of the fallopian tubes during tubal ligation.

#### Interval sterilization
Sterilization performed 28 days or more after the last delivery.

#### Laparoscope
A slender, stainless-steel tube containing a set of lenses and a fiber-optic cable connected to a light source. When light is transmitted through the cable, the surgeon can see inside the abdominal cavity. Devices to perform abdominal procedures, including tubal occlusion, are inserted either through a channel in an operating laparoscope or through a second abdominal incision.

#### Laparoscopic sterilization
Female sterilization procedure in which a laparoscope is inserted into the abdomen through a small opening made with a trocar on the edge of the navel. A harmless gas, such as carbon dioxide, nitrous oxide, or room air, is pumped into the abdomen to distend it and separate the internal organs from the abdominal wall. The surgeon sees the fallopian tubes through the laparoscope and can reach and block them with instruments placed through the laparoscope or inserted through a second abdominal incision.

#### Laparotomy
Surgical procedure in which a 5 to 10 cm vertical incision is made in the abdomen. For many years this was the only approach for female sterilization. It is also used for other abdominal surgical procedures.

#### Minilaparotomy
Female sterilization procedure in which a small lateral incision is made, either just above the pubic hair for interval procedures or below the navel for postpartum procedures. Then, by moving the uterus from side to side, the surgeon can bring each tube to the incision and block it.

#### Parkland (or Pritchard’s) technique
This tubal ligation technique involves separating a small segment of fallopian tube from the mesosalpinx (the broad ligament surrounding the tube). The segment of tube is tied in two places with chronic suture, and the portion of the tube between the two places is removed. (See drawing, p. 11.)

#### Pomeroy technique
The Pomeroy technique is the most widely used tubal ligation technique. Absorbable catgut sutures are used to tie the base of a loop of fallopian tube near the midportion (ampulla). Then the top of the loop is cut off. After the sutures are absorbed, the cut ends of the tube separate. (See drawing, p. 11.)

#### Postpartum sterilization
Sterilization procedure performed during cesarean section or shortly after delivery. Postpartum sterilization can be performed as soon as the placenta is delivered. It is best performed within 48 hours after delivery. Minilaparotomy is the preferred procedure for postpartum sterilization.

#### Trocar
A pointed surgical instrument used to enter the abdomen for laparoscopic procedures, including voluntary sterilization, or to pierce the skin for other procedures such as Norplant insertion.

#### Uterine elevator (manipulator)
A long, thin instrument inserted into the uterus through the cervix before minilaparotomy. The surgeon uses the uterine elevator to move the uterus and bring each fallopian tube to the abdominal opening. This instrument is not used in a postpartum procedure.

#### Veress needle
In laparoscopy, the needle used to introduce gas into the abdomen to create the pneumoperitoneum before inserting the laparoscope.

#### The Challenge to Programs
As demand for female sterilization services continues to increase, programs face the challenge of providing safe, effective, high-quality care to growing numbers of clients. There are four areas in which programs must maintain high standards:

- **Medical standards.** The first requirement for high-quality medical care is competent, trained personnel whose performance is monitored and supervised regularly. In addition, these personnel need guidelines that assure medical safety and minimize the risk of complications. Such guidelines should specify the pre-operative, surg-
call infection control, and monitoring procedures to be followed with each client. Providers must be able to respond to emergencies or problems during or after surgery. Also, surgical equipment must be sterilized or disinfected before each use and maintained in proper working order.

- **Counseling standards.** Counseling about voluntary sterilization involves a one-to-one discussion with a family planning provider covering the nature of the procedure, its permanence, possible complications of the procedure, its benefits, and a review of other available contraceptive methods. Clients seeking sterilization must make an informed choice without pressure or coercion by anyone. Family planning programs need to emphasize and document this point. All clients should sign an informed consent form. Clients especially need a clear explanation and must clearly indicate their understanding and approval. After the procedure postoperative instructions must be given clearly.

- **Training standards.** Surgeons, counselors, nurses, and other clinic staff all need training and supervision to ensure consistent, high-quality care. Training for all providers of voluntary sterilization should cover both medical/surgical responsibilities and communication with clients. The training itself should be evaluated regularly to ensure that the content is timely and relevant to each provider's job.

- **Information standards.** Couples need to know about voluntary sterilization—including how it works and where to get it—long before they need to consider using it. Accurate, unbiased, understandable information should come from a variety of sources including the mass media, other public discussions of family planning, and one-on-one counseling sessions with prenatal, postpartum, or family planning clients. All family planning providers and outreach workers should know about and be able to discuss voluntary sterilization with their clients.

## Providing High-Quality Clinical Services

While female sterilization has become much more available, techniques have changed little in recent years. Current techniques are very effective and safe. Even with proven techniques, however, the quality of services can vary from place to place and among providers. The provider's careful attention to correct technique, as learned in training and reinforced by supervision, can assure the effectiveness and minimize the complications of female sterilization surgery.

### Reaching the Fallopian Tubes

Laparoscopy and minilaparotomy are the procedures of choice to reach the fallopian tubes (see Table 3). These two procedures are simple, safe, and inexpensive, and they can be performed on an outpatient basis.

Several large studies have found minilaparotomy and laparoscopy to be almost equally safe and effective (101, 152). Minilaparotomy, however, has several advantages over laparoscopy. Minilaparotomy:

- Requires only simple, inexpensive, easily maintained surgical equipment;

Two methods of voluntary female sterilization: in minilaparotomy (above) each tube is brought to a small incision in the abdomen and blocked, usually by ligation, as shown here. In laparoscopy (below) the laparoscope lets the surgeon see inside the abdomen and insert instruments to block the tubes, usually with clips or rings.

### Is easier for less skilled providers to perform and thus can be more widely offered;

- Is the preferred procedure for postpartum sterilization;

### Involves lower start-up and continuing costs than laparoscopy services; and

- Does not require sophisticated facilities, and thus more health centers can offer it.

At the same time, laparoscopy has advantages in a large, well-equipped hospital:

- Laparoscopic sterilization is slightly quicker and easier to perform than minilaparotomy;

### It causes less discomfort to the patient;

- The laparoscope can be used for diagnostic and therapeutic procedures as well as for sterilization; and

### Some physicians prefer performing laparoscopy to minilaparotomy (150).

Furthermore, hospitals that serve as centers for laparoscopy can usually attract the volume of cases needed to maintain the staff's skills and to justify the cost of buying and maintaining the equipment.

In most countries a combination of laparoscopy and minilaparotomy services is appropriate. Laparoscopy is provided in a few urban centers, while minilaparotomy is offered more extensively in basic facilities in both urban and rural areas.

POPULATION REPORTS
Consideration

<table>
<thead>
<tr>
<th>Instruments and equipment</th>
<th>Minilaparotomy</th>
<th>Laparoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires a few inexpensive, standard surgical instruments and two special instruments—a tubal hook and a uterine elevator.</td>
<td>Requires delicate and expensive endoscopic equipment. Ongoing maintenance required. Spare parts must be available.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electricity</th>
<th>Not necessary.</th>
<th>Necessary.</th>
</tr>
</thead>
</table>

| Surgical skills and expertise | Can be performed by any physician with basic surgical ability and skills after special training in the technique. Nonphysicians cannot be trained in this technique. | Restricted to specially trained surgeons and gynecologists. |

<table>
<thead>
<tr>
<th>Setting</th>
<th>May be performed in maternity centers and basic health facilities with surgical capacity.</th>
<th>Requires hospital or health facility with an anesthetist and general anesthesia backup available.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical time</td>
<td>Usually performed in 10 to 20 minutes.</td>
<td>Performed in 5 to 15 minutes. Useful for services with large daily case loads.</td>
</tr>
</tbody>
</table>

| Contraindications | Pelvic scarring, adhesions, and obesity make the procedure difficult. Acute pelvic infection is an absolute contraindication. | Not recommended for postpartum procedures or in women with previous lower abdominal surgery. Acute pelvic infection is an absolute contraindication. |

| Risks and complications | Low complication rate. Slightly higher rate of wound infection than with laparoscopy. Injury to broad ligament may require additional surgery. Slight risk of bowel or bladder injuries, uterine perforation. | Low complication rate. Severing the fallopian tube or injury to broad ligament may require additional surgery. Slight risk of vascular injury, bowel injury, and insufflation accidents. |

| Postoperative pain | Postoperative abdominal pain may occur. Slightly longer recovery than with laparoscopy. | Postoperative chest and shoulder pain resulting from abdominal insufflation may occur. |

### Table 3

**Comparison of Minilaparotomy and Laparoscopy for Female Sterilization**

- **Electricity**: Not necessary.
- **Surgical skills and expertise**: Can be performed by any physician with basic surgical ability and skills after special training in the technique. Nonphysicians cannot be trained in this technique.
- **Setting**: May be performed in maternity centers and basic health facilities with surgical capacity.
- **Surgical time**: Usually performed in 10 to 20 minutes.
- **Contraindications**: Pelvic scarring, adhesions, and obesity make the procedure difficult. Acute pelvic infection is an absolute contraindication.

### Blocking the Tubes

Female sterilization is one of the most effective contraceptive methods. With the most widely used occlusion techniques—that is, methods of blocking the fallopian tubes (see Table 4), fewer than one woman in every 100 will become pregnant within two years (91). Some new evidence suggests that long-term, cumulative failure rates may be higher, indicating that some pregnancies may occur after the first two years (115). The chance of failure, while slight, can be minimized by increased attention to the quality of services.

Which occlusion methods work best? Often the most effective occlusion method for an individual woman is the one that her provider performs most often and is most comfortable with. In minilaparotomy the Pomeroy and Parkland procedures, in which the fallopian tubes are ligated ("tied") and cut, are recommended because they are easy to perform, very effective, and inexpensive (150) (see drawings, next page.) The Pomeroy technique is the most widely used because of its simplicity. The Parkland technique, however, causes less interruption of the blood supply to the tube (156). With any ligation technique, failure can occur when the wrong structures are ligated or if the separated ends of the tube grow back together. Ligation cannot be used with laparoscopy.

Clips, rings, and electrocoagulation are used chiefly with laparoscopy. They also can be used with minilaparotomy but may be slightly less effective than ligation (35). Some physicians prefer clips because clips damage a smaller area of tube, maximizing the potential for reversal if the client later changes her mind (see box, p. 18).

With clips and rings, placement is crucial. They should be placed on the isthmus of the fallopian tube—the segment of the tube that is 1 to 2 cm from the uterus. Pregnancies can...
occur if a clip or ring is placed too far from the uterus, on the ampulla of the tube, where it is thicker and the device can fall off or not enclose the entire tube. If the surgeon is uncertain whether a clip is properly placed, he or she can apply another clip to the tube (53, 69). Another error is applying the clip or ring to the wrong structure, such as the broad ligament.

Electrocoagulation involves destroying a portion of the tube with heat created by electrical current in a special forceps. At least 3 cm of each tube should be completely coagulated to ensure sterilization (116). All electrocoagulation equipment should be checked periodically to make sure that it works properly. Also, providers should check that the incisors and generators are compatible so that enough current is delivered to the tubes to coagulate them completely (116).

Complications

Complications are few in female sterilization. In large studies major complications, such as anesthesia-related injuries, infection, hemorrhage, and cardiovascular complications, are reported in no more than about 1% of cases, and usually less. Minor complications such as wound infection or slight bleeding occur in less than 5% of cases. Some studies have found slightly higher complication rates for laparoscopy than for minilaparotomy (120).

Deaths due to female sterilization are very rare. In a review of about 900,000 cases in the U.S. between 1978 and 1980, only 13 deaths occurred—one in every 70,000 procedures (52, 109).

The most common complications are caused by anesthesia-related problems, infection, and internal injury.

<table>
<thead>
<tr>
<th>Timing of Sterilization</th>
<th>Surgical Approach</th>
<th>Recommended</th>
<th>Acceptable Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval sterilization</td>
<td>Minilaparotomy</td>
<td>Pomeroy</td>
<td>Silastic band</td>
</tr>
<tr>
<td>(26 days or more after last delivery or abortion)</td>
<td>Parkland</td>
<td>Filshie clip</td>
<td>Spring clip</td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>Silastic band</td>
<td>Filshie clip</td>
<td>Spring clip</td>
</tr>
<tr>
<td>Laparotomy</td>
<td>Pomeroy</td>
<td>Filshie clip</td>
<td>Spring clip</td>
</tr>
<tr>
<td>Laparotomy (with cesarean section)</td>
<td>Parkland</td>
<td>Silastic band</td>
<td></td>
</tr>
<tr>
<td>Postpartum sterilization</td>
<td>Minilaparotomy</td>
<td>Pomeroy</td>
<td>Filshie clip</td>
</tr>
<tr>
<td>(during cesarean section or within 48 hours after vaginal delivery)</td>
<td>Parkland</td>
<td>Filshie clip</td>
<td></td>
</tr>
<tr>
<td>Postabortion sterilization</td>
<td>Minilaparotomy</td>
<td>Pomeroy</td>
<td>Filshie clip</td>
</tr>
<tr>
<td>(immediately after a nonseptic, induced or spontaneous abortion)</td>
<td>Parkland</td>
<td>Silastic band</td>
<td></td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>Silastic band</td>
<td>Filshie clip</td>
<td>Spring clip</td>
</tr>
</tbody>
</table>

The Filshie clip, here shown in three positions, is one of the most widely used clips for blocking the tubes. Some surgeons prefer to use clips because they damage the smallest length of tube, thus maximizing the chances that later reversal would be successful.

Table 4

Timing, Surgical Approaches to the Fallopian Tubes, and Associated Occlusive Techniques for Female Sterilization

Recommended methods are considered preferable for routine use in developing countries because of low cost, simplicity, and minimal associated risks.

Electrocoagulation seldom used as an alternative in developing countries. Bipolar electrocoagulation is routinely used in the United States and Canada.

Laparoscopy may be done when other approaches are not appropriate for reasons such as obesity or pelvic scarring, or when sterilization is performed during another abdominal procedure.

Source: Adapted from WHO & AVSC (1989)
Anesthesia

Most of the major complications of female sterilization procedures result from overuse of general anesthesia or from heavy sedation during local anesthesia. Complications of general anesthesia are responsible for as many as one-third of deaths associated with female sterilization (53). In the large US review of the 13 deaths (39%) were related to complications of general anesthesia. The other deaths were due to infection, hemorhage, cardiovascular complications, and other causes (52, 109).

Local anesthesia with light systemic sedation—instead of general anesthesia—can virtually eliminate anesthesia-related complications and deaths. It is better than general anesthesia for many reasons:
- Safer for the patient,
- Less costly,
- Appropriate for both laparoscopy and minilaparotomy.

Making It Happen:
The KENYA STORY

"I would like to spread the gospel of tubal ligation to my friends and others," said a Kenyan woman after her own surgery (24). And it seems that she is doing so. Almost 5% of Kenyan women are protected from pregnancy by voluntary sterilization. The method is the most widely used form of contraception among Kenyan women over age 30 (14).

The popularity of voluntary female sterilization is new, however. Not long ago experts were predicting that sterilization would never be accepted in Africa (30, 56). According to public-sector service statistics in 1982 only 68 Kenyan women were sterilized through organized programs. Only two hospitals provided the service. But by 1990 there were 50 active centers, and more than 11,000 women had the procedure in sites assisted by the Association for Voluntary Surgical Contraception (AVSC) with support from the United States Agency for International Development (see graph and map, next page). These sites constituted nearly all organized providers in private practice. By 1989 more than 70% of women who were sterilized had been sterilized with local anesthesia. By 1989 more than 70% of women who were sterilized had been sterilized with local anesthesia.

How did this growth happen? While economic conditions are inspiring the desire for fewer children (24, 155), providing services and telling people about them have made voluntary female sterilization accessible. The availability of high-quality female sterilization services offered women an opportunity that they had been lacking.

Making services available has required efforts on many fronts. Most important have been:
- The support and donors, and a variety of service providers to the expansion of high-quality female sterilization services.
- Availability at many different service sites and from many providers.
- The emphasis on high-quality services and training providers. Over 200 doctor-nurse teams have been trained in minilaparotomy with local anesthesia, and more than 100 medical students are trained annually (78). More than 300 counselors and 600 field educators have been trained as well (47).
- The increasing use of minilaparotomy with local anesthesia—a safe, inexpensive, and acceptable procedure (50).
Appropriate for all methods of tubal occlusion,
Simpler to administer and does not require a full operating room,
Shorter in both procedure time and recovery time,
Appropriate for outpatient services,
Often more acceptable to patients, and
Especially recommended for women with severe medical problems such as cardiac, tubal disease, diabetes, and thyroid irregularities (44, 53, 54, 92, 110, 112).

Even local anesthesia must be used carefully. The most common complication associated with local anesthesia is overdose of systemic sedatives that are given to relax the patient and make her more comfortable. Because of this risk, and because of the scarcity and expense of these drugs, some programs have eliminated them and use just the local anesthetic at the incision site (see box, p. 15). A rarer complication is toxicity due to overdose of the local anesthetic. Both these complications can be avoided by careful monitoring.

Insistence on counseling about all family planning methods to ensure voluntarism and avoid later regret (50).

Inclusion of voluntary sterilization along with other methods in clinic staff and outreach workers' discussions of family planning. All staff who work in facilities that provide female sterilization are trained to tell clients about the method and to answer clients' questions. In addition, community outreach workers are trained by FPAN to sell their clients on sterilization and other methods. The outreach workers often accompany clients to a health center for the procedure and wait to take them home afterward (130). Kenyan attitudes toward voluntary female sterilization are very positive, especially when compared with those in other African countries, where services are quite limited. The difference in attitudes is clear in a comparison of focus-group discussions with female sterilization clients and potential clients in Kenya and in Zaire, where female sterilization is not promoted, supported, or readily available.

In Zaire sterilization clients were hesitant to tell others about their surgery, while in Kenya most clients wanted to share their satisfaction with others. Men and women in Zaire thought that sterilization was justified only for medical or health reasons, whereas in Kenya the motivation for having the procedure was most often the economic burden of a large family. Finally, potential clients in Kenya were more willing to face criticism from the older generation than those in Zaire, who said that the pressure for continued childbirth was enough to dissuade them from considering a permanent method (24, 36). As one man in Kenya put it, "Let us not spoil this nice program by involving our in-laws... I am sure they will approve of us later for the good work we have done or the good life we will lead" (34).

The female sterilization program in Kenya is changing providers' attitudes toward vasectomy, too. Although vasectomy has been considered even less likely to win popularity in Africa than female sterilization, providers of vasectomy report increasing numbers of clients, and other providers are asking to be trained in the procedure. Because of this interest the Kenyan Ministry of Health is considering a national training program in no-scalpel vasectomy. In this procedure a small puncture replaces the incisions in the scrotum (130).

Kenya now serves as a model for other African countries wanting to develop female sterilization programs. Since 1986 over 50 provider teams from more than 20 African countries have been trained in Kenya. Female sterilization programs have been established in Ethiopia, Ghana, Guinea, Madagascar, Mali, Nigeria, Rwanda, Tanzania, Uganda, and Zambawi, all applying the experience and lessons learned in Kenya.
Injection of local anesthetic around the incision site permits voluntary female sterilization with minimal discomfort to the patient and with much more safety than using general anesthesia. Providers need to learn, however, to talk to the patient reassuringly.

Both of the dosage administered and of the patient’s vital signs during the procedure (61, 148). Providers, especially those trained only in general anesthesia, are often reluctant to use local anesthesia. Many providers are not comfortable talking with patients during procedures and prefer to operate on women who are unconscious. Also, because some women under local anesthesia feel pulling sensations, pain, or discomfort during the procedure, the surgeon must work gently, especially when moving the pelvic organs.

Most female sterilization procedures can be done with local anesthesia, but not all. General anesthesia is recommended for women with severe respiratory problems who need an airway or respiratory assistance during surgery. It is also recommended for women who are very obese and for those who have had previous abdominal surgery or pelvic infections. These women often require longer operating time and extensive intra-abdominal manipulation. With just local anesthetics, procedures can occur at two points: (1) when the surgical instruments enter the abdomen and (2) during the tubal occlusion procedure. During laparoscopy internal organs and major blood vessels can be punctured if the Veress needle, used to introduce gas into the abdomen, is inserted incorrectly, or if the trocar used to enter the abdomen is placed incorrectly (11, 53). Robb instruments should be inserted at an angle of about 60° to the body. During minilaparotomy internal organs can be injured if a surgeon accidentally cuts a piece of bowel that has adhered to the abdominal wall. The bladder can be injured if it has not been emptied or if the incision is made too low. All surgeons who perform sterilizations must be able to recognize and repair any internal injuries that occur during the sterilization procedure.

Bowel burns are a potentially serious complication of electrocoagulation, although they occur infrequently (91). The bladder, ureter, and major blood vessels also can be injured. For this reason in many places electrocoagulation is not recommended or endorsed (150).

**Counseling Clients**

High-quality counseling is crucial to any family planning program. Counseling is intended to ensure that clients make free and informed decisions about family planning. Counseling requires both giving unbiased information and helping clients make their own, uncoerced decisions (41, 90). Good counseling requires both empathy and information. Providers need to show that they care about their clients and establish an atmosphere of understanding, respect, and honesty. At the same time, providers should have accurate information and know how to communicate it clearly to clients in language that they understand. Ideally, providers help clients consider the pros and cons of family planning methods in light of the client’s own circumstances. In this way providers help clients make informed choices that are appropriate for them (90).

Because female sterilization is intended to end fertility permanently, and because reversal is hard to obtain and cannot be guaranteed, counselors must take special care with clients who are interested in the method. To assure that the client makes an informed choice, the counselor must accomplish four important tasks:

- **Tell the client about the range of methods available;**
- **Screen the client to be sure that she will not regret her decision later;**
- **Explain the sterilization procedure and its benefits, risks, and possible complications; and**
- **Obtain informed consent.**

Tell the client about the range of methods available. Each client needs to know all the methods she can choose from, including methods available through referral. The client must know enough about the advantages and disadvantages of all methods to be able to make an informed choice among them.

Screen the client. Since sterilization is intended to end fertility permanently, providers must try to make sure that a woman will not later regret her sterilization. They can do this by helping women to address their own feelings about ending their fertility. A 1986 study of sterilized women in Hawaii found that women who were satisfied with their sterilization counseling were more likely to be satisfied with the decision to be sterilized as well (88). Studies of women who have been sterilized have identified the characteristics of women most likely to regret the proce-
Appropriate Technology: Adapting Clinical Services

Providers often adapt surgical techniques to local conditions or discover new, more efficient ways to operate. In female sterilization surgery these adaptations have been developed that may be safer for the patient and easier for the provider:

- In minilaparotomy, local anesthesia without sedation;
- In minilaparotomy, replacing the uterine elevator with forceps and gauze;
- In hysteroscopy, direct introduction of the trocar before abdominal insufflation.

Local anesthesia without sedation. In many countries sedatives and anesthetics are difficult to obtain. In these places minilaparotomy can be performed using local anesthesia only, without sedation. While not difficult, working without sedating the patient often requires more concentration of the operating team; more attention needs to be focused on the patient. The team must talk to her throughout the procedure, and the surgeon must be very gentle, especially when moving the abdominal organs. In some programs a counselor accompanies the patient in the operating room to reassure her. Local anesthesia without sedation, while often more uncomfortable, is safer for the patient either than general anesthesia or local anesthesia with sedation; any chance of oversedation is eliminated. This technique should not be used with women who are very tense or who are found to have abdominal adhesions. These patients may move too much or experience a great deal of pain (61).

Forceps and gauze instead of a uterine elevator. A ring forceps holding gauze pads can be used in place of a uterine elevator to move the uterus during interval minilaparotomy, when the uterus is low in the abdomen. The forceps with gauze is inserted into the cul de sac of the vagina behind the cervix (posterior fornix). It is used to lift the uterus to the minilaparotomy incision. This technique, developed by providers at Chulalongkorn University in Thailand and presented at the 1990 meeting of the Society for the Advancement of Contraception in Singapore, has been used successfully in Thailand and may present several advantages to providers who adopt it elsewhere. First, it eliminates the risk of uterine, bladder, and rectal penetration and of cervical injury by the uterine elevator as it passes through the cervix into the uterus. Second, the forceps with gauze does not have to be inserted by the surgeon; it can be inserted by a nurse or other member of the operating team. This could be an advantage in countries such as Bangladesh where, by custom, a male provider should not perform a vaginal procedure. Third, the ring forceps are much more available than the uterine elevator. Fourth, this technique may be quicker and more comfortable for the patient than the standard technique (49, 61).

Direct trocar insertion. With this technique, at the beginning of laparoscopy, before insufflation, the surgeon lifts the abdominal-wall layers through the layers of tissue in the peritoneum. He or she then inserts the laparoscope, checks its placement, and introduces gas into the abdomen through the laparoscope (76). The Veress needle for insufflation is eliminated.

Greater skill and experience are needed to use this technique rather than the conventional approach. Providers should perform several hundred conventional procedures using the Veress needle and receive special training before trying direct trocar insertion. In the hands of an experienced, skilled surgeon, direct trocar insertion is as safe as or safer than the Veress needle technique. A recent study involving 200 women found fewer minor complications with direct trocar insertion than with the conventional technique—6% compared with 20% (105).

Direct trocar insertion has several other advantages. It is easier for the surgeon to insert the trocar before the abdomen is inflated with gas, since less force is needed to penetrate the tissues, and the surgeon can more easily feel each layer of the abdomen as the trocar passes through it. The laparoscope can be inserted before insufflation, and its position checked. This check eliminates the chance of attempting insufflation when the Veress needle is not in the peritoneal cavity. This is a particular advantage with obese women (68). Direct trocar insertion also reduces operating time, a benefit to both patient and provider (25, 76, 125).
Increasing Sterilization Services for Postpartum Women

Just after delivery may be a good time for voluntary sterilization. Why?

- The woman is already in a medical facility. Indeed, pregnancy and childbirth may be the only time she has access to modern health care.
- The 48 hours after delivery are a safe time for sterilization.
- Minilaparotomy can be easily performed postpartum.

Postpartum sterilizations are common. In places as different as Cuba, Jordan, Malaysia, Puerto Rico, and sub-Saharan Africa, postpartum sterilizations are more common than interval sterilizations (121). Even in the US, where various contraceptive methods are readily available, more than one-quarter million postpartum sterilizations are performed each year—almost half of the total (15, 59). The percentage of women who choose sterilization after childbirth has been rising in the US. In 1970, 4% of women giving birth in hospitals choose to be sterilized; in 1985, 10% (135).

Advantages and Drawbacks

Why should a program consider offering or expanding postpartum services? There are both medical and programmatic advantages:

- Postpartum services can reach women who otherwise would not have access to sterilization services.
- Minilaparotomy is easier to perform postpartum than in the interval period. For one to two days after delivery the uterus is high in the abdomen, and an incision of 1.5 to 3 cm just below the navel allows easy access to the tubes. There is no need for a uterine elevator. Postpartum minilaparotomy should be performed within 48 hours after delivery. After 48 hours the uterus begins to go back to its original position. Then a lower and larger incision may be needed, one that will leave a more obvious scar. Further, just where to make the incision is not as certain, and the tubes are less accessible. Also, after 48 hours there may be bacteria in the tubes and endometrial cavity, which can cause infection (148).
- Local anesthesia with light sedation or analgesia is especially appropriate because several painful or uncomfortable aspects of minilaparotomy are avoided, such as insertion of the uterine elevator.
- Recovery time is no longer than for interval procedures (148).
- Postpartum procedures are cost-effective because they are provided through the existing clinical infrastructure, often by clinic staff (14).
- If a woman delivers or plans to deliver in a health care facility, her medical history and current health status can be assessed. If the child dies or is ill, the woman may want to reconsider her decision and postpone sterilization. Lastly, as counseling about postpartum sterilization involves special concerns, training for counseling should address it specifically.

At the same time, the safety and voluntarism of the services must be assured. Some possible drawbacks of postpartum services include:

- A decision made under stress may be more likely to be regretted. Providers must make especially sure that the decision for postpartum sterilization is well-considered and not influenced by the stress of labor and delivery. The woman should make her decision and sign any informed consent form before labor begins.
- The risk of hemorrhage during the procedure is higher in the postpartum period because blood vessels surrounding the tubes and uterus are engorged. For this reason hysteroscopy is not recommended during this period. The provider must take special care when exposing the tubes and be certain that the sutures, rings, or clips on the tubes are secure to prevent slipping and hemorrhage. The tubes are bigger and softer in the postpartum period, and it is often more difficult to place a ring or clip on the tube.
- Integrating family planning and maternity services may be difficult and start-up costs, particularly for training staff, may not be affordable. The entire program may need to be reconceptualized to include sterilization services (15, 65).

Counseling About Postpartum Sterilization

Ideally, counseling about postpartum sterilization should begin long before a woman gives birth. Indeed, the basic information about voluntary female sterilization, including the option of postpartum sterilization, should be made common knowledge through the mass media and other sources (see p. 21). For some pregnant women prenatal care offers repeated opportunities to get information, ask questions, consider the various contraceptive methods, and discuss her decision with her partner and others. The informed consent form for voluntary sterilization should be signed at this time rather than during labor. Many women, however, do not receive prenatal care where they deliver—if at all—and many women learn about or request sterilization only when they arrive at the health center to deliver. If a provider decides, after thorough discussion with the client, that she will regret the sterilization, surgery should be postponed, and the woman should be offered temporary methods and the option of an interval procedure at a later time. Because counseling about postpartum sterilization involves special concerns, training for counseling should address it specifically.

After labor and delivery the health of the newborn should be assessed. If the child dies or is ill, the woman may want to reconsider her decision and postpone sterilization. Lastly, as with all sterilization clients, the provider should confirm the woman’s consent orally before starting the procedure to make sure that she is certain she will not want more children (19).
Counseling involves informing women about their choices and helping them make free, well-considered decisions. Women who choose female sterilization also need to learn about the method and the procedure and to give informed consent, usually signing a consent form, as here in Tunisia. The client is not making a free, well-considered decision, he or she may want to recommend instead a long-term, nonpermanent family planning method such as an intrauterine device (IUD), Norplant, or an injectable.

Counselors should give women considering sterilization a realistic picture of reversal surgery. In particular, the client should understand that:

- Reversal surgery is not available to everyone. The client may not have access to a facility where it is performed or may not be a suitable candidate for reversal.
- Even if reversal surgery is available, its success is not guaranteed.
- Reversal surgery is more complex, expensive, and risky than the initial sterilization procedure.
- Reversal surgery increases the risk that a pregnancy will be ectopic (outside the uterus), a potentially life-threatening condition (see box, p. 138).

In summary, no one should be sterilized expecting to have it reversed later.

Some programs and some physicians have set up rigid requirements to try to avoid sterilizing women who might regret it later. They may require that a woman be a certain age, and/or have a certain number of children, or have her husband's written consent (40). Rigid restrictions of this sort may deny services to some women who understand and want female sterilization. Instead, the provider should encourage the client during counseling to discuss her plans and desires about future childbearing and her husband's attitude toward voluntary sterilization, among other matters. If a woman is making a well-considered choice based on her own circumstances, providers should not deny services to her.

Explain the procedure and its benefits, risks, and side effects. Once a client has decided on sterilization, she needs to know what the procedure involves. Clients who know what will happen to them during the procedure are less likely to worry about complications and more likely to be satisfied with the procedure than clients who are not prepared. Clients should be told what type of anesthesia would be used (general or local), which procedure they would have (laparoscopy or minilaparotomy), and what to expect afterwards (17).

Many women fear that the procedure will be painful. Therefore the counselor should describe how the local anesthetic will be applied and what the patient will feel. The doctor injects the local anesthetic with a needle just below the naval in the area where the incision will be made. The injection feels like a bee sting. After the injection, skin and muscles in the area become numb, and the patient should not feel any pain when the doctor makes the incision. She may feel a pulling sensation when the doctor moves the internal organs. With laparoscopy, when the abdomen is insufflated, the patient may experience a feeling of fullness (13).

Obtain informed consent. After a client has decided on female sterilization, most programs require that she sign an informed consent form. It is informed consent itself that is important, however; the form simply documents that consent. The client signs the form to indicate that she understands the essential facts about female sterilization and has made her decision voluntarily. To be able to give informed consent, the client should understand six points, which should have been covered in counseling:

- There are other methods available to her and her husband.
- Female sterilization is a surgical procedure.
- There are risks and benefits to the method, including a small risk of failure.
- She will no longer be able to have children if the procedure is successful.
- The procedure is permanent and probably cannot be reversed.
- She can change her mind at any time before the procedure (29, 140).

If the client does not understand these points, she cannot give informed consent, even though she may sign the form. To be voluntary, her consent must be a free choice and not made because of any special inducement, force, fraud, deceit, pressure, or any other coercion or misrepresentation (140).

Providers must take special care when obtaining informed consent from women who cannot read the informed consent form. For example, in programs supported by the United States Agency for International Development, if the client cannot read, a witness of the same sex who speaks the same language as the client must sign the form testifying that the client received an oral explanation of the procedure, its risks and benefits, and alternatives (141).

Informed consent is different from informed choice. A client should make an informed choice among family planning methods—or choose to use no method—based on information about all available methods. If she chooses female sterilization, she then must give informed consent and, if the program requires, sign or mark the informed consent form, which documents her decision to have the procedure and her understanding of its risks, benefits, and permanence (41). It is the provider's responsibility to ensure that the client fully understands and freely consents to the procedure.

Training Providers

Training plays a central role in assuring the quality of sterilization services. Different types of providers—physicians, nurse-midwives, nurses, and counselors—can be trained in settings ranging from university medical schools to regional training centers to freestanding clinics.

Training for Surgery

To meet growing demand, many doctors and nurses already in practice need to learn to perform female sterilization. For
Reversing Female Sterilization

Most women are satisfied with their decisions to be sterilized. But a few women later request reversal surgery. About 0.1 to 0.3% of sterilized women in developing countries and 1% to 5% of sterilized women in developed countries ask about surgery to restore their fertility (147). The major reason for regret is remarriage.

The capability to perform reversal surgery is available to some extent in nearly every country where female sterilization is available. In a 1988 survey by the United Nations Population Fund for Voluntary Surgical Contraception, all 28 developing countries surveyed reported having the capability for reversal services. Services are not accessible to most sterilized women, however. Reconstructive tubal surgery may be available only for treatment of infertility, not for sterilization reversal. Reversal surgery, when available, is usually performed in urban centers by private physicians at high cost to the patient (147).

Reversal surgery is major abdominal surgery that involves removing the damaged parts of the tubes, aligning the remaining segments, and suturing them together to create a secure team. Reconnecting the tubes is difficult because they are small and slippery, and care must be taken to avoid putting stitches in the lumen, or opening, of the tube if possible. Microsurgical techniques, including magnification, minimal surgical trauma to tissue, and careful alignment of the tube sections, allow specially trained surgeons to reconnect some blocked tubes effectively. The surgery takes one to four hours.

Successful reversals are usually defined as those that result in a live birth. In recent studies, conducted in developing countries and China, a live birth followed 30 to 90% of attempts at reversal (42, 70, 75, 87, 88, 129, 131, 153). Women who undergo reversal surgery are at increased risk of ectopic pregnancy. This is the most serious potential complication of the reversal procedure. The ectopic pregnancy rate among women who had reversal surgery in the studies mentioned above ranged from 2 to 5% of pregnancies—over twice the rate for pregnancies among women in the general population (87). Most ectopic pregnancies occur one year or more after the reversal surgery (129). They seem most likely to occur when the two ends of the reconnected tubes are of different sizes (110, 117, 131, 143).

Who Are Candidates for Reversal?

Not all women who request reversal surgery are good candidates for the procedure. The best candidates are sterilized women who:

- Are in their late 30s or younger,
- Are in good health,
- Have a fertile partner,
- Have minimal damage to their tubes (5).

Assessing Tubal Damage

The likelihood of successful reversal surgery depends on the length of the tube after it is reconnected, the site of reconstruction, whether one or both tubes can be repaired, and the skill and experience of the surgeon performing the reversal procedure (42, 70, 75, 131, 153) as well as on the health and fertility of the client. The length of the tubes after the reversal appears to be most important (42, 70, 87, 131, 153). Many surgeons prefer not to operate if less than 3 to 4 cm of tube remains, but the final decision may be left to the patient. When reconstructed tubes are less than 4 cm long, pregnancy is much less likely than when the tubes are longer (47, 70, 75, 118, 131).

How much tube is left for reconstruction depends on how much damage the sterilization caused. This in turn depends partly on how the tubes were blocked. Electrocoagulation usually damages the longest portion of the fallopian tubes—often 3 to 8 cm. Some surgeons use a "multiple burn technique"—blocking several places on each tube. This increases the amount of tubal damage. Women sterilized by this method are not good candidates for reversal surgery (147). Lithotripsy techniques damage about 2 to 5 cm, and clips, about 3 cm of the tube. Clips cause the least damage—about 3 mm (5, 67). Diagnostic laparoscopy may be needed to see how much tube is damaged. A review of sterilization reversal studies found that live birth rates varied according to occlusion technique, averaging 41% after reversal of electrocoagulation, 50% after reversal of the Pomeroy (ligation) procedure, 75% after reversal of rings, and 84% after reversal of clips (147). The period between sterilization and the reversal did not affect the live birth rate in most of these studies.

What Can Programs Do?

Oclusion technique. Programs can use the occlusion techniques that minimize damage to the tubes. The Parkland ligation technique with microscissors and clips or rings with laparoscopy usually use the least destructive and might be the best choice, especially in young clients with few children.

Reversal surgery. If the program cannot provide reversal surgery, it should try to refer the client to a physician or facility that can. In fact, in most countries referral networks are essential because reversals can—and should—be performed only at highly specialized centers. In some countries, such as Guatemala and El Salvador, referral networks are informal; local family planning programs try to find physicians who perform reversal surgery for clients who request it. In Latin America, Indonesia, and South Korea, in contrast, referrals are more formal. Regional reversal centers have been established, and local health centers refer clients to these facilities (97, 147).
both laparoscopy and minilaparotomy, in-service training can be conducted in university training facilities or regional training centers. For minilaparotomy—since extensive specialized equipment is not needed—training also can take place in freestanding clinics with sufficient caseloads. Wherever training takes place, it requires:

- Experienced trainers familiar with the procedure and the training curriculum.
- Adequate surgical facilities and equipment, and
- Sufficient patients for each trainee both to observe a number of procedures and to practice newly acquired skills under supervision.

Some programs, especially those just introducing sterilization services, may not be able to provide in-country training. Doctors and nurses are trained in another country, where services are well-established. Programs should plan for some of these initial providers to become trainers and develop training programs in their own countries (16, 151).

Selecting trainees. Who should be trained to perform female sterilization? In most developing-country programs there are three broad criteria for selecting trainees:

1. He or she should have some experience performing abdominal surgery. Laparoscopy trainees should, in addition, be practicing obstetricians/gynecologists, general surgeons, third-year obstetrics/gynecology residents, or other physicians with at least three years of experience in abdominal and pelvic surgery. Experience with minilaparotomy and surgery under local anesthesia also is desirable.

2. The provider should want to perform the service.

3. He or she should plan to and be able to offer services in the community after training (148). Where doctors cannot meet the demand for sterilization services, nurses and nurse-midwives have been trained to perform interval or postpartum minilaparotomies. In pilot studies comparing doctors' and nurses' performance in Bangladesh, Thailand, and Uganda, nurses have performed sterilization? In most developing-country programs there are some initial providers to become trainers and develop training programs in their own countries (16, 151).

What to teach? Minilaparotomy and laparoscopy require a number of unique skills. Since most providers are not familiar with these techniques, training courses need to emphasize them. They include:

- Using local anesthesia. Surgeons need to be trained to infiltrate each layer of tissue with anesthetic and to make sure before beginning the procedure that the anesthetic has numbed the entire area around the incision site.

- Using gentle surgical technique. Many surgeons and nurses are not accustomed to operating on awake and alert patients. Training needs to stress the use of gentle surgical technique, especially in minilaparotomy when the incision must be held open and when the surgeon is moving the abdominal organs.

- Communicating with the patient. Since the patient is conscious and awake during the sterilization procedure, she needs to be told what is happening and reassured during parts of the procedure that may be uncomfortable.

- Monitoring the patient. Constant communication is a very effective monitoring tool, but, even if the patient is awake, her blood pressure, pulse, and other vital signs need to be checked and recorded during surgery. Stand-by equipment should be available in case of emergency, and trainees should learn how to use it.

- Manipulating the uterus and tubes. During interval minilaparotomy two-handed coordination is required to rotate the handle of the uterine elevator with one hand while grasping the fallopian tubes with the other. Most trainees have not used this technique, and it is often the most difficult skill to master.

Training methods. Training should replicate, as much as possible, the conditions under which the trainees will practice in their communities. In most developing countries this means emphasizing minilaparotomy with local anesthesia. Also, teams that will work together should be trained together. The curriculum should minimize lectures and give trainees as much time as possible observing, assisting, and practicing sterilization procedures. This includes observing and practicing medical screening and postoperative follow-up. Trainees should perform at least 10 laparoscopic sterilizations or 10 minilaparotomies on their own under direct supervision (148). Some training or certification programs may require trainees to perform more procedures. Usually, a combination of lectures, discussions of readings, case studies with question-and-answer periods, demonstrations of technique, and clinical practice works best (149).

Training medical students. Should medical students be trained to perform female sterilization? In some countries, including Bangladesh, Colombia, India, Kenya, Madagascar, Pakistan, Thailand, Uganda, Zambia, and Zimbabwe, all medical interns are trained to perform cesarean section under local anesthesia as part of their obstetrics and gynecology rotation. In Brazil the Dominican Republic, Ecuador, Indonesia, Paraguay, and the Philippines, all obstetric and gynecology residents are trained (133). In most other places only postgraduate physicians are trained. On one hand, training medical students assures a steady supply of providers able to perform the service. On the other hand, training students who will not provide services is not efficient, and the time and resources needed for high-quality training may be better spent on those who will put their training to use. The decision should be based on the needs and resources of the country.

If medical students are trained, the curriculum should resemble that used for in-service training. It should emphasize counseling and communication skills as well as technical skills and infection control procedures.
Training To Counsel

In a sterilization program counseling is everybody's job—from the family planning nurse who first greets the patient to the surgeon who performs the procedure, while the surgeon confirms the client's decision. All of these personnel require some counseling training.

Counseling skills can be taught in professional schools, during in-service family planning training, or in separate training workshops. When counseling training is made part of overall family planning training, programs are ensured of a continuing supply of workers who view counseling as an integral part of their jobs and not as a separate activity that can be set aside (see Population Reports, Counseling Makes a Difference, J-35, November 1987, and New GATHER Guide to Counseling, J-48, December 1998).

Those who counsel women interested in sterilization need the specific skills to:

- Ensure that the client understands that sterilization is permanent;
- Screen clients for characteristics that may predict regret (see p. 145);
- Help the client anticipate how she may feel about her decision if one of her children dies or if she remarries;
- And, if the client chooses sterilization, to:
  - Prepare the client for the psychological effects of ending her fertility, and
  - Prepare the client for surgery (see p. 17).

Ultimately, it is the surgeon's responsibility to ensure that the client is making an informed choice. All surgeons should learn, as part of their training, about the purpose and importance of counseling and the role in ensuring a client's informed and voluntary decision for sterilization.

The training curriculum. A curriculum lays out the steps and activities involved in training counselors. For example, the Association for Voluntary Surgical Contraception (AVSC) has developed a prototype curriculum with help from service providers and counselor trainers from 10 African countries. Known as the "Mombasa Curriculum" because it was developed at a workshop in Mombasa, Kenya, this plan trains people who provide initial family planning and sterilization counseling and who are responsible for providing information and helping clients explore their feelings about sterilization and arrive at a voluntary decision whether or not to use the method (12).

The training covers both technical information about female sterilization and the interpersonal communication skills necessary to counsel clients. For example, the curriculum includes exercises in which counselors can clarify their own values and be better prepared to present information and alternatives in a neutral, objective manner, without imposing their own values on the client. Trainees are asked to consider their own reactions to statements such as: "If a woman wishes to have a tubal ligation, she should do so even if her mate disagrees" and "If a woman never experiences childbirth, she will feel like less of a woman."

A number of teaching tools are used, including group discussions and small-group projects, role-playing, lectures, observation of counseling sessions, and counseling clients while under observation. The course can last three to eight days depending largely on the counseling experience of the trainees and how long they can be released from work.

While model curricula such as this provide useful guidelines for training, it is important to adapt them to the needs and education levels of the trainees as well as to local program requirements. For example, training should help counselors word their explanations in ways that fit the health beliefs of their clients. Also, in some countries a husband's consent is required for a woman to obtain sterilization. In some countries there are age and/or parity requirements. In these instances training should teach counselors how to obtain this information from the client.

Supervision and monitoring. Supervision and monitoring are essential to ensure that counselors provide informed, voluntary counseling effectively. Counseling can be supervised and evaluated in several ways: unobtrusive direct observation of counseling sessions, interviews with clients, and examination of the written case histories and recommendations recorded by the counselor. Often a member of the training team visits newly trained providers where they work. The visits allow the trainer to observe counseling and to train further if necessary. The trainer also can work with program administrators to ensure that the trained counselors are actually counseling women considering sterilization and not involved entirely in unrelated tasks. If counselors are supervised and continually monitored, refresher training is not needed unless there is a major programmatic change, such as a switch from general to local anesthesia or the introduction of postpartum services.

Informing the Public

Voluntary female sterilization deserves more publicity. In most places women learn about female sterilization services directly from other people—friends, neighbors, relatives, or family planning workers. For example, surveys have found that in Tunisia the majority of sterilized women—40%—heard about the procedure from friends and relatives, while 29% heard about it from health workers or other medical personnel; in Colombia the figures were 49% and 40%, respectively; in Guatemala 40% and 30%; and in Indonesia 40% and 35%. In contrast, the mass media have played a minor role. For example, in Tunisia less than 8% of sterilized women surveyed had learned of the method through the mass media; in Colombia less than 5%; and in Guatemala almost 10% (85).

For the most part female sterilization has not been publicized or even publicly discussed. Providers may worry that they could not provide services to meet increased demand or that publicizing the method would arouse charges of pressuring women to use it. While all communication must be carefully designed and pre-tested to avoid even the appearance of pressure, this reluctance to mention voluntary female sterilization only does women a disservice. It makes giving full consideration to all methods and making an informed, deliberate choice more difficult.

Surveys of women's knowledge appear to reflect the lack of public discussion about voluntary sterilization. Despite the widespread use of the method, it often does not come to mind. Asked to list all the family planning methods that they know, women are much more likely to mention oral contraception (OCS) than they are to list voluntary female sterilization.
Figure 2. Relationship Between Levels of Knowledge and Levels of Use of Female Sterilization and Oral Contraceptives Among Married Women of Reproductive Age in 25 Countries

Note: The dotted lines are regression lines that show the relationship between knowledge and use of each method in these countries as it can best be represented by a straight line.
Source: Demographic and Health Surveys

zation. For example, in nine Latin American and Caribbean countries with Demographic and Health Survey (DHS) data, a median of about 20% spontaneously mentioned female sterilization as one of the methods they knew, while a median of 76% mentioned OCs. But many more women used voluntary sterilization—a median of 15% compared with 8.5% using OCs.

Indeed, in 25 Demographic and Health Surveys throughout the developing world, five women spontaneously mentioned female sterilization for every two using the method, while nine women spontaneously mentioned OCs for every two using the method (see Figure 2). In most countries, however, this difference almost disappeared when interviewers mentioned methods and asked women if they had heard of them. It may be that women know about sterilization but do not consider it along with other family planning methods. Programs need to address this problem when publicizing all family planning methods and when discussing voluntary female sterilization specifically. They can portray female sterilization as a good family planning method for couples who already have all the children they want, just as they portray OCs as a good method for couples who want to space their children.

In fact, people need to learn about voluntary sterilization long before they need the services. For many couples sterilization is the last in a series of contraceptive methods that they use as they move from spacing their children to ending fertility. For others, sterilization is the first (and only) modern method that they use (14). For example, according to DHS findings in 12 of 19 developing countries one-third or more of sterilized couples had not previously used another modern contraceptive method. In Bolivia, El Salvador, Kenya, and Peru, the figure was over 50%; in Sri Lanka, 69%. In contrast, more than 80% of couples in Morocco and in Trinidad and Tobago had used other modern methods before using sterilization (124). Both types of couples should think about sterilization for some time before they undergo the procedure.

To assure that couples learn about sterilization well in advance, information should come from a variety of sources and should be included in:
- Providers' formal and informal discussions of contraceptive methods with clients, women's groups, men's groups, students, policy-makers, the news and entertainment media, and others interested in family planning;
- Individual counseling sessions with all new and continuing family planning clients;
- Mass-media promotion and discussion of contraceptive methods; and
- Training sessions for family planning clinic staff, counselors, and community-based distributors.

What kinds of information about female sterilization do people need? Initial audience research should determine what people see as the advantages and disadvantages of voluntary sterilization and should reveal their concerns.

For example, focus-group research in Zaire, where sterilization services are quite limited, found that both men and women believe voluntary female sterilization is justified only for medical reasons related to POPULATION REPORTS
difficulties with pregnancy or childbirth, since there is great pressure from the husband's family to bear many children. Most women stressed the need for confidentiality (36). In Kenya, however, economic considerations were the main reason given for having the procedure (24). In Colombia a survey revealed that 8% of women sterilized believed that the procedure was not permanent (53). Mass-media presentations as well as educational materials presented by family planning providers or other health workers should address concerns and misconceptions and explain female sterilization accurately.

Depending on the needs of the audience, specific messages could be:
- Tell couples that there is a way to end childbearing completely;
- Encourage potential users to get more information about the method and tell them how to do so;
- Tell people where and when to go for sterilization services;
- Legitimate the idea that contraceptive needs change and that many family planning users switch to sterilization once they have all the children they want; and
- Help reduce fear about the method, refute false rumors, and encourage visits to a family planning clinic.

Regardless of which messages are emphasized, audience research and pre-testing are needed to ensure that messages are understood and appealing to the intended audience. All presentations should make clear that sterilization services are not coerced. This message can be stated explicitly or, perhaps more convincingly, implied by presenting, as role models, users who clearly have made a free and well-considered choice. Although surveys have not shown that other sterilized women are among the most influential persons in a woman's decision to have the procedure—usually a partner or relative is more influential—women who are well informed and aware of and satisfied with tubal occlusion can be important referral sources for future users of the method (85).

In particular, it is important that information be clear and unbiased, helping couples to make their own voluntary, informed, and well-considered decisions.
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