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Recent experiences and lessons learned in vasectomy programming in low-resource settings: A document review

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Recent Experiences and Lessons Learned in Vasectomy Programming in Low-Resource Settings: **A DOCUMENT REVIEW**



Recent Experiences and Lessons Learned in Vasectomy Programming in Low-Resource Settings: A Document Review

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Acronyms

ACQUIRE – Access, Quality, and Use in Reproductive Health Program

CHW – Community health worker

CYP – Couple-years of protection

DHS – Demographic and health survey

FI – Fascial interposition

FP – Family planning

FRONTIERS – Frontiers in Reproductive Health Program

INFO – Information and Knowledge for Optimal Health

IUD – Intrauterine device

LAPM – Long-acting and permanent method

LE – Ligation and excision

MAP – Men as Partners

MOH – Ministry of Health

NGO – Nongovernment organization

NSV – No-scalpel vasectomy

PROGRESS – Program Research for Strengthening Services

PVSA – Post-vasectomy semen analysis

RH – Reproductive health

SDA – Supply-Demand-Advocacy

SEED – Supply-Enabling Environment-Demand

TOT – Training of trainers

VSC - Voluntary surgical contraception

Executive Summary

National family planning (FP) initiatives over the past several decades have led to significant gains in the prevalence of contraceptive use, effective spacing of children, and achieving desired family size in many developing countries. National initiatives continue to expand the quality of and access to FP services, including expanding the range of contraceptive methods offered to women. Vasectomy has been an available contraceptive option for men in some countries, but its use in most countries is limited and while engaging men in FP has long been an important goal, it has largely remained elusive. However, more recently, research and programs that engage men in FP and combat inequitable gender norms have increased in effectiveness and scope. By maximizing the confluence of existing infrastructure and more positive attitudes toward FP use, and by building upon the existing body of effective male involvement interventions, now is an opportune time to incorporate vasectomy into national FP strategies. Evidence related to vasectomy uptake and outcomes are essential to ensure that policymakers have what they need to make informed decisions on strengthening vasectomy in FP programming.

Fortunately, the tools to integrate vasectomy into national FP agendas are available from programs previously implemented around the globe. Policies and international clinical and counseling standards can be adapted from other countries. Provider training is supported by well-established materials, inexpensive tools (forceps, cautery devices), and cadres of experienced vasectomy trainers both within sub-Saharan Africa and beyond. Additionally, a variety of male engagement interventions exist to combat inequitable gender norms, to increase reproductive health (RH) knowledge among men, and to increase contraceptive use. Ten years ago, low-resource countries may not have been ready to integrate vasectomy into scaled-up FP programs. Today, that is no longer true.

We have extensively reviewed the recent research literature on vasectomy acceptability, as well as programmatic reports from the leading international FP programs conducted over the last decade, to synthesize the existing evidence and programmatic experiences around common barriers and facilitators to vasectomy adoption and to make recommendations for future research, programmatic, and advocacy efforts. Understanding the success or failure of different strategies to promote vasectomy among men and couples will provide low-resource settings a starting point upon which to build future vasectomy advocacy efforts and tailored implementation models. This document review consolidates the evidence supporting the premise that vasectomy uptake is an important component to national FP programs — particularly, in settings where government and family resources are limited — and that with proper planning, technical assistance and political and financial support, an increase in vasectomy use in these areas can be a reality.

Introduction

Why promote vasectomy in low-resource settings

Vasectomy is a highly effective method for helping couples reach their desired family size, but is too often under-utilized. Female sterilization (tubal ligation) is the most commonly used form of contraception worldwide, being the method selected by 19 percent of women of reproductive age who are married or in a union (1). Conversely, male sterilization (vasectomy) lags far behind most other available short-term or long-acting methods, with a prevalence of only 2.4 percent globally (1). Less developed countries contribute to the highest use of female sterilization, but have the lowest prevalence of vasectomy. Regionally, the prevalence of vasectomy in African countries is less than 0.1 percent. In Latin America and the Caribbean it's around 2 percent and is only slightly higher in Asia and Europe at around 3 percent (2). The greatest use of vasectomy for family planning (FP) is found in Oceania and North America at 10 percent and 12 percent, respectively (2). In most areas where permanent contraceptive method use is low, couples too often depend on short-term methods (e.g. condoms, pills, injectables) for limiting future births, because either they have reached desired family size or otherwise do not want future children. This is both expensive in the long-term and less effective given product failure, discontinuation, and/or incorrect use.

Finding ways to increase vasectomy uptake will provide major cost-savings. The 2012 American Urological Association guidelines suggest that vasectomy is one of the most cost-effective of all methods of contraception, with an estimated cost per couple-years of protection (CYP) that is less than tubal ligation (3, 4). Additionally, recovery time for vasectomy clients is significantly less than that for women who receive a tubal ligation, requiring less investment of time. It also requires local rather than general anesthesia and is usually performed in a doctor's office or clinic. Most importantly, the potential complications of vasectomy are less serious than those of tubal ligation (3). Given the comparative safety and efficacy of vasectomy over female sterilization, greater advocacy efforts promoting the use of vasectomy for couples who wish to limit future births is necessary in many developing countries.

Safety and efficacy of vasectomy

Vasectomy is an easy-to-provide, safe, and highly effective contraceptive method (5). However, evidence shows that there is variation in safety and effectiveness of the procedure when comparing the choice of surgical techniques. Traditionally, the technique for isolating the vas deferens (the duct that carries sperm from the testes to the urethra) was done through an incision. Today, the majority of vasectomies are performed using no-scalpel vasectomy (NSV), which only requires a small puncture to be made in the scrotum under local anesthesia to access the vas deferens. Occluding (blocking) the vas deferens also can be performed using multiple methods including ligation, excision, clips, cauterization, implantation of an intra-vas device, fold-back, fascial interposition (FI), and irrigation. Some of these occlusion techniques are still in development (e.g. intra-vas devices) and vary in effectiveness (5).

NSV has been found to be the preferred technique by physicians for isolating and accessing the vas deferens, because it decreases the risk of surgical complications such as bleeding and infection (6-8). The most common method for occlusion, ligation and excision (LE), consists of putting two ligatures on the vas deferens and excising a small segment between the ligatures (9). Rigorous studies show that this technique is associated with a higher risk of occlusive failure (8 to 13 percent based on post-vasectomy semen analysis [PVSA]) than other methods of occlusion (6), even when combined with FI (6 percent failure rate) where a layer of the vas sheath (fascia) is placed between the two cut ends of the vas deferens. The risk of contraceptive failure (unwanted pregnancy) is unacceptably high with simple LE, varying between 4 and 9 percent after three to 10 years, as reported in a 2005 review of vasectomies performed in a number Asian countries (9).

Results from numerous large case series have shown that combining cauterization of the lumen of the vas deferens with FI results in the lowest risk of occlusive failure (well below 1 percent, according to PVSA) (6, 8). This technique is already widely used in North America (10). Recently, it was integrated within all district hospitals across Rwanda (11), providing evidence that providers can be trained in this method and maximize the effectiveness of ongoing programs (12). Data on the appropriate use of cautery and FI in low-resource settings are very scarce (9, 13), and the Rwanda experience provides a unique insight into how effectively it can be integrated (11). In countries where vasectomy is first being integrated into the method mix, contraceptive failure may adversely affect the perceptions and beliefs about vasectomy and negatively affect subsequent uptake of vasectomy services. Thus, it is important that the most effective means of occluding the vas deferens is encouraged through proper provider training and support.

Past efforts to increase uptake of vasectomy services in low-resource settings

Over the last decade, the U.S. Agency for International Development (USAID) has been the primary donor of vasectomy programs in low-resource settings. In fact, our review uncovered only a handful of documents published from programs unrelated to funding received through one of five cooperative agreements supported by USAID. As a result, this review focuses heavily on the documented experiences of these cooperative agreements. They include the Frontiers in Reproductive Health Program (FRONTIERS), the Access, Quality, and Use in Reproductive Health Program (ACQUIRE), the Capacity Project, Program Research for Strengthening Services (PROGRESS), and the RESPOND Project. Detailed descriptions and the global reach of each of these recent cooperative agreements is summarized in Appendix I.¹ Altogether, these programs sought to inform communities about various FP methods by promoting accurate information about modern methods, dispelling negative misperceptions, and generating more gender-equitable norms around RH and the use of FP methods. Additionally, they sought to improve FP services by training health care staff, supporting quality service provision, integrating services, and influencing policy. Each of these programs focused, in part, on

¹ Note that there are other ongoing cooperative agreements that include vasectomy integration and scale-up as part of their work plans, but documents related to these projects were not identified using our search criteria.

introducing vasectomy into settings and clinics where there was no prior significant uptake of the method and very little (if any) prior technical experience.

Objectives

This review summarizes recent studies exploring the knowledge of, attitudes toward and acceptability of vasectomy among individuals in many low-resource settings around the globe. At the same time, it summarizes the common characteristics and motivations for vasectomy among the early adopters in these societies — men that have set aside the cultural norms of their social environment and adopted vasectomy as their families' means of limiting future child births to achieve desired family size. Finally, this document review describes the various ways in which vasectomy services have been promoted and provided over the last decade, including descriptions of program implementation models, promotional and provider training costs, and lessons learned from recent programs. Information from this review will form the basis for advocacy materials tailored to specific countries of interest and for other reports that will be included in dissemination activities.

Methods

We conducted a systematic document search of peer-reviewed and grey literature in April 2015 using eight search engines: Popline, Pubmed, Global Health, Cumulative Index to Nursing and Allied Health Literature, All Africa, Academic Search Premier, Google Scholar, and USAID's Development Experience Clearinghouse. In order to limit our search to the most current and relevant literature, our inclusion criteria included documents published only within the last 10 years. Keywords used in the search were *vasectomy* or *male sterilization*, and *accept**, *communication strategy*, *contraceptive methods chosen*, *counsel**, *delivery of health care*, *demand*, *evaluat**, *health services*, *implement**, *intervention**, *introduce**, *messaging*, *program**, *promot**, *scale up*, *scaling up*, *social marketing*, *success*, or *uptake*.ⁱⁱ It is possible that some important resources may not be reflected in this current review. We have referenced a few of these additional resources in other sections of this document.

Our search retrieved more than 230 documents. Upon review of the abstracts, approximately two-thirds of these documents were excluded from the full document review, because they were duplicate references; published prior to 2005; not available in English; primarily related to contraceptive use in the United States, Australia, Canada, or the United Kingdom; or otherwise did not meet our inclusion criteria. The remaining 75 documents were categorized according to their subject matter by two analysts. Appendix II summarizes all articles included in this review. Matrices were created in Excel to summarize and synthesize the content of the documents in each category, to highlight important

ⁱⁱ Including an * (asterisk) at the end of a keyword will include all variations on the search term. The * can represent zero or more terminal characters in a search term. For example, *promot** will retrieve entries for all documents containing the words promote, promotes, promoted, promotion, promotions, promoting, promoter, promotable, etc.

barriers of and facilitators to vasectomy uptake, and to highlight key recommendations identified by the authors for future vasectomy programs.

Results

Documents were categorized into the following three main themes: 1) knowledge, attitudes, and acceptability; 2) vasectomy user perspectives and characteristics; and 3) vasectomy service provision. We further categorized the vasectomy service provision section following the Supply-Enabling Environment-Demand (SEED) Programming Model™: 1) creating, increasing, and sustaining demand for vasectomy services; 2) increasing supply of vasectomy services; and 3) creating an enabling environment for vasectomy programs. The SEED Programming Model™ categories have been established as a useful global framework for sexual and RH programming (14).

Knowledge, attitudes and acceptability

Our search identified 34 qualitative and quantitative research articles related to knowledge of, attitudes toward, and acceptability of vasectomy among individuals from 15 low- and middle-income countries (see Appendix II). In addition, there was one review of acceptability of contraception among men worldwide (15). For the purpose of this review, *knowledge* is defined as the level of information (accurate or inaccurate) an individual has about vasectomy; this is predicated by an initial *awareness* of vasectomy as a means of male contraception. *Attitude* is defined as the degree to which an individual positively or negatively perceives vasectomy and its effects. Finally, *acceptability* is defined as a man's willingness to have a vasectomy, or a woman's or health care provider's willingness to support or recommend vasectomy as a means of achieving desired family size. Note that many of the articles cited in our review discussed vasectomy in the context of the use or provision of FP in general or of long-acting and permanent methods (LAPMs) in particular. This section focuses only on the knowledge of, attitudes toward, and acceptability of vasectomy.

Our document review revealed a mix of perspectives from various audiences, including men, women, couples, health workers (e.g. FP providers, community health workers [CHWs], male health workers, doctors), and other key informants (e.g. policymakers, nongovernment organization [NGO] staff, community leaders). Male and female informants were typically married and had at least one child, but in some cases young or unmarried men and women were included. Six articles also included perspectives from vasectomy clients and partners of men who have had a vasectomy.

Knowledge about vasectomy

Potential contraceptive clients (men and women)

In much of the literature, both men and women were typically unaware of vasectomy as a FP method, or they had limited knowledge about how the procedure is performed and/or misperceptions about the impact vasectomy has on a man's physical and sexual health after the procedure. In five studies from

Ethiopia, Nigeria, and Turkey (16-20), awareness of vasectomy as a FP method ranged from 15.6 percent of women in Ethiopia (16) to 39.6 percent of unmarried men in Turkey (17).

Exceptions to the generally low awareness of vasectomy were found in articles from Nepal and India; however, basic knowledge of how the procedure is conducted or requirements related to follow-up or side effects from the procedure were still lacking. In a quantitative study, more than three-quarters (77 percent) of married female gynecology patients in Nepal knew about vasectomy (21). In two similar surveys conducted in India, men were very aware of the concept of “male sterilization” but either did not know the term “no-scalpel vasectomy” or did not know the details associated with the procedure. In one study with married men in India, 97.4 percent knew that NSV was a form of male sterilization; however, three-quarters did not know that NSV usually requires one hospital visit, and about a third thought that NSV requires prolonged bedrest and affects sexual performance (22). Another study in India reported that 90.1 percent of men knew about male sterilization but only 10.6 percent knew about NSV (23). The greater awareness of male sterilization in Nepal and India may be due to higher overall prevalence of vasectomy in these countries, though efforts are clearly needed to advance basic knowledge of the procedure among potential clients.

Across studies, the most commonly mentioned misperceptions about vasectomy among both men and women were:

- A man becomes physically weaker after having a vasectomy.
- A man becomes unable to function sexually after having a vasectomy (e.g. is unable to have an erection/has impotence, has reduced sexual desire, is incapable of enjoying sex or satisfying a woman, has impaired ejaculation).
- Vasectomy is the same as castration.

Few differences between men’s and women’s knowledge and misperceptions about vasectomy were discussed in the literature. Two qualitative studies, one from Malawi (24) and one from Nigeria (25), found that men were less knowledgeable than women about FP methods in general and LAPMs specifically. In the Malawi article, many male participants thought that vasectomy would reduce men’s sexual desire or lead to sexual dysfunction. Similarly, the fear of reduced sexual performance as a result of vasectomy was commonly mentioned among women in a qualitative study conducted in India (26). In a qualitative study in Ghana, women believed that vasectomy could result in physical weakness, making the man less productive (27).

Service providers

Five articles from Africa and Asia discussed knowledge about vasectomy among health workers and had mixed results. One quantitative study found that doctors in Nigeria had good general knowledge of vasectomy as a permanent method, but the majority believed that having a vasectomy would alter the normal functioning of the testes. Some also thought that it would impair a man’s ability to ejaculate or would increase his risk for prostate cancer (28). Another quantitative study in Nigeria found that that 90 percent of male health workers interviewed were aware of vasectomy, but had varying degrees of knowledge as to whether local, general, or no anesthesia was used during the procedure (29). A qualitative study from Cambodia found that, in general, village-level providers had little or incorrect

knowledge about LAPMs, including vasectomy (30). Two surveys conducted in India explored vasectomy knowledge of CHWs and found that there was a great deal of knowledge around a person's eligibility for vasectomy as well as how long the procedure typically takes, but little knowledge of whether NSV requires stitches, the amount of time required away from work, and the amount of time required to use contraception after the procedure. In addition, some CHWs believed that after having a vasectomy a man would lose physical strength to do heavy work, become weak or get sick often, would not be able to have an erection or ejaculate, and would have a reduced libido (31, 32). It is evident from these studies that more needs to be done to improve provider knowledge about vasectomy, particularly among frontline community-based health workers to ensure accurate information is disseminated to the public and the method is promoted equally across the local method mix.

Attitudes toward vasectomy

Negative attitudes

Many articles in our search described negative attitudes men and women had toward vasectomy. Negative attitudes were tied to inaccurate knowledge (above) and fueled erroneous assumptions about how vasectomy affects men psychologically and physiologically (19, 20, 22-27, 29, 33-39).

In some studies, participants perceived that vasectomy hurt a man's pride (40) or caused a man to lose his "masculinity" (41). Men worried

that others would view them negatively if they found out they had a vasectomy (26, 30). In Ghana, participants felt that if a man got a vasectomy he would be viewed as "under the control" of his wife (27). Similarly, in interviews with women in India, respondents worried that a man would be viewed as a "slave to his wife" (26). Women in another study in India added that they thought that female sterilization was better than vasectomy, even though female sterilization is more invasive, because it

Perceptions contributing to negative attitudes toward vasectomy

Among potential contraceptive clients:

- Perceived negative impact on a man's physical strength and ability to work
- Perceived negative impact on a man's ability to have sex
- Loss of masculinity, pride, or social status
- Perception that men do not use contraception
- Perception that one's religion or traditional culture was against FP in general or permanent methods specifically
- Concern about the surgery, side effects, or recovery time
- Vasectomy not safe or there are safer alternatives
- FP services not being "male-friendly" (e.g. only female providers available or targeting of women only)
- Uncertainty of future desires to have children
- Female partner may be unfaithful if she desires more children
- Concern that contraceptive failure would result in the female partner being accused of infidelity
- Disinhibition toward male promiscuity (i.e. no longer at risk of impregnating mistress)

Among service providers:

- Perception that female sterilization is more appropriate given the geo-cultural context
- Fear of complications during surgery
- Demand perceived to be too low to sustain provision

was better for a woman (than a man) to be “debilitated” since the economic contributions of men are more highly valued than those of women (38).

A number of studies included negative attitudes related to the perception that vasectomy would lead to greater infidelity. Interviews with men in Tanzania (35, 36) and men and women in Cambodia (30) and Ghana (27) revealed that many communities are concerned that wives may be unfaithful or leave if they want more children or if the husband is unable to perform sexually after having a vasectomy. Women in the same studies in Tanzania and Ghana worried that their husbands would feel that they could be unfaithful if they had a vasectomy because they would not worry about getting other women pregnant (27, 35, 36). Some women in India worried that if a vasectomy failed and they got pregnant they could be accused of infidelity (26).

Two articles shared FP providers’ negative attitudes toward vasectomy that influenced their willingness to provide vasectomies (28, 42). Both of these studies described how some providers acknowledged that they typically do not mention vasectomy as an option during FP counseling sessions or that they more openly encourage female sterilization instead. For example, a quantitative study from Nigeria found that 89.4 percent of doctors interviewed said they often counseled about female sterilization, but only 5.8 percent counseled on vasectomy (28). Correspondingly, more than 80 percent of doctors interviewed thought that the average Nigerian man would not accept vasectomy and that female sterilization was more “appropriate” in the Nigerian context. A qualitative study from China revealed that providers, particularly young surgeons, did not want to provide vasectomy due to the fear of complications resulting from the procedure, and because there are so few cases that they would not make a profit by providing vasectomies (42).

Positive attitudes

Fewer than half of the articles discussed positive attitudes toward vasectomy. Positive attitudes were primarily discussed in the context of motivators that led people to be in favor of or undergo a vasectomy. The perception that vasectomy is highly effective and therefore couples would not have to worry about pregnancy or having children out of wedlock were the most commonly mentioned positive attitudes (25, 34-36, 43).

In a qualitative study in Cambodia, men and women viewed female and male sterilization as “relatively healthy modern methods” and some viewed vasectomy as a way for husbands to share in FP responsibilities (30). Similarly, in a qualitative study in China, vasectomy was positively viewed as less expensive and as having a faster recovery time than female sterilization (42). Men in one Indian study perceived that vasectomy was “easy” and “not a danger” (23), and in another study in India that NSV was a “simple and painless” procedure (26). In a Nigerian survey of 136 men, 82.4 percent of married men agreed that vasectomy is effective and should be advocated for as a FP method (20). Hearing positive stories and examples of successful NSV cases was one of the main drivers promoting positive attitudes toward vasectomy in India — women felt encouraged and men were more open to the procedure (26).

In some cases, men and women had different attitudes toward what they perceived as the beneficial aspects of vasectomy. For example, women in Malawi generally had more positive attitudes toward vasectomy than men did (24). Reasons for this included women being relieved of the burden of using contraception, believing there would be a lower likelihood that a man would engage in polygamy

or have a child out of wedlock, and seeing it as a sign of a man's love for his wife and security in their future happiness and health. Likewise, women in Tanzania approvingly thought that if their husbands had a vasectomy, there would be a lower likelihood of husbands having a child out of wedlock (35, 36). Men in the Tanzanian studies (35, 36), as well as studies in Brazil (43), Rwanda (44-46), and India (26), described how vasectomy was beneficial in preserving the health of women (e.g. by avoiding frequent pregnancies and negative impacts of other forms of contraception) and that it was considered a minor procedure compared to female sterilization.

Acceptability of vasectomy

In most of the documents reviewed, acceptability of vasectomy was very low, mostly due to low knowledge and negative attitudes. For example, more than half (53.6 percent) of married female participants in an Ethiopian study had negative attitudes toward the use of LAPMs and no one used vasectomy (16). Only a small percentage of men in a Nigerian study agreed or conditionally agreed that they would personally consider having a vasectomy (47). In another study in Nigeria, less than a fifth of the women surveyed said they would recommend vasectomy to their husbands (19). In India, even though several women thought that vasectomy had more advantages than female sterilization, no one believed that village men would find vasectomy acceptable (38). In another Indian study, 68 percent of male respondents found male sterilization to be an acceptable contraceptive option, but only 34 percent said they were willing to adopt NSV (22).

Among health care workers, professional acceptability (i.e. willingness to refer clients for vasectomy) did not translate into personal willingness to use the

method themselves. For example, in a Nigerian study, 19.2% (n=48) of married male health workers were willing to accept vasectomy as a contraceptive method; but among these few, none of them had had a vasectomy (29). Similarly, in another study in Nigeria, 41.3 percent of male and female doctors interviewed said they would opt for vasectomy or urge their husbands to, but none of the doctors or their partners had actually had a vasectomy (28). In these articles, individual knowledge and positive attitudes alone did not necessarily equate to actual use of vasectomy.

In many cases, vasectomy was viewed as the least preferred FP method and was often used only as a "last resort" in instances such as a woman not being able to use other FP methods, a woman's health being negatively affected by having another child, or a man being older and having many children (25, 26, 30, 34). Noticeably, there is a persistent sentiment that FP is a woman's duty and that all female contraceptive options should be exhausted before a man considers getting a vasectomy (17, 20, 37). Cultural and gender norms often lead to preference for female contraceptive options and low acceptance of vasectomy.

In many cases, vasectomy was viewed as the least preferred FP method and was often used only as a "last resort."

Vasectomy user perspectives and characteristics

Understanding who the “typical” vasectomy client or couple is in a particular region can help vasectomy program implementers fill service gaps and address unmet need, or tailor messaging to the lives of specific populations. Seventeen articles from around the globe (see Appendix II) described vasectomy users’ socio-demographic characteristics at the time of getting a vasectomy, motivations for getting a vasectomy, and satisfaction with services.

Two global reviews (2, 15) found that couples who chose vasectomy were older, married, and had more children than couples using reversible methods. However, socioeconomic levels, education levels, and numbers of children of vasectomy clients varied regionally. For example, in some regions (e.g. Latin America and the Caribbean), couples who chose vasectomy were more likely to be from higher socioeconomic levels, whereas in others (e.g. India and Bangladesh), they were from lower socioeconomic levels (2, 15).

Our review found similar patterns overall, and highlights that the characteristics of vasectomy clients vary greatly depending on the geo-cultural context. In several sub-Saharan African countries (Ghana, Kenya, Tanzania, and Rwanda) and India, vasectomy clients were older and had more children, with average ages over 40 years (range 40.7 to 45.5 years) and four or more children on average (range 4 to 6.3) (35, 36, 39, 46, 48-50). In most of the articles, men had little income with low educational attainment or low literacy (49, 51-53). For example, in Pakistan, out of 150 vasectomy clients, the majority were from a low socioeconomic class, mostly illiterate, and employed as laborers or unskilled workers (53); and in Rwanda most clients were rural farmers (49). In India, more men in rural areas than urban areas had vasectomies (54), whereas in Iran, 85.5 percent of vasectomy users resided in urban areas (52). In Ghana, employment status was higher, and vasectomy clients were a mix of professionals and semi-skilled workers (48). With regard to contraceptive history, previous contraceptive use among the wives of vasectomy clients varied from a low of 37 percent in Pakistan (53) to 59.2 percent in Turkey (51) and 87 percent in Rwanda (46). Also, we should note that these trends in the characteristics of vasectomy users likely do not reflect the full range of potential vasectomy clients in these regions — merely, those that have chosen the method. Nonetheless, similarities do emerge cross-culturally; a typical vasectomy client is:

The main motivators that led to getting a vasectomy included satisfaction with family size, limited financial resources, concern for women’s health, and dissatisfaction with other contraceptive methods.

- Over 30 year old
- In a committed relationship (i.e. in union or married)
- Has multiple children
- Has a history of prior contraceptive use (as does his wife)

Overall, men and women who use vasectomy for contraception were satisfied with the procedure, particularly the fast recovery time and the fact that it did not disrupt their sexual function

(42, 44, 50, 55). The main motivators that led to getting a vasectomy included satisfaction with family size, limited financial resources (not being able to afford more children), concern for women's health (desire to avoid pregnancies, births, and side effects from contraception), and dissatisfaction with other contraceptive methods (15, 35, 36, 39, 42, 44, 46, 49, 53). Counseling or advice from a health worker, peer, or satisfied client were significant motivators for men to get vasectomies (15, 35, 36, 39, 42, 49, 50, 56). Men in Ghana (48), Rwanda (46), and Turkey (51) typically reported having heard about vasectomy through the media or health care workers (CHWs and clinic-based health care providers), which helped them learn about and access services.

Vasectomy service provision

Thirty-one documents provided information about past programs focused on increasing vasectomy uptake in resource-limited settings around the world. The majority of these references included programmatic reports, project summaries and briefs, curricula, and original research and peer-reviewed manuscripts generated by the five USAID-funded cooperative agreements described in Appendix I. Eight additional documents that were identified and are included in the summary below were not directly affiliated with these multinational programs (12, 31, 57-62). Most documents were descriptive in nature and did not include impact or effectiveness evaluations. Therefore, what follows are descriptions of procedures and elements of the programs from the past decade related to 1) creating, increasing, and sustaining demand for vasectomy services; 2) increasing supply of vasectomy services; and 3) creating an enabling environment for vasectomy programs.

Demand creation

In order to be motivated to use vasectomy services, an individual or couple needs accurate knowledge of and positive attitudes toward vasectomy. They also need to have the capacity to use vasectomy services, such as knowing where services are available and understanding details about the procedure, such as side effects, recovery time, and time required to use backup contraception. Here, we describe three demand-creation activities related to vasectomy documented in our review: community-based and mass media communications (and associated costs), an employer-based promotion intervention, and a group counseling approach.

Community-based and mass media communications

Community-based and mass media communications have been used to increase awareness of and drive demand for vasectomy in several low-resource settings around the world. The Capacity Project's pilot program in Rwanda developed a number of different communication materials aimed at community-level distribution in order to address the general lack of knowledge and negative attitudes toward vasectomy in the community. Communications strategies included

- A pilot program of a community-based campaign in which CHWs informed and educated local men about vasectomy and dispelled false rumors about the procedure (49)

- Creation of an illustrated flipchart and booklet with 10 gender-equitable decision-making messages on several public health topics, including vasectomy, to aid in discussing male engagement in a couple's RH (45)
- Formation of 12 vasectomy support cooperatives comprised of NSV clients, with income-generating activities and with the goal of reducing stigma, dispelling rumors and increasing demand for vasectomy at a local level
- Video testimonials of clients that became part of a project-produced DVD to be used as part of information, education and communication/sensitization campaigns (44, 45, 49)
- For scale-up of NSV with thermal cautery and FI, provision of vasectomy counseling services by CHWs and dissemination of strategic messaging by the Rwandan Ministry of Health (MOH) through various media outlets, including radio, which helped to inform potential clients of upcoming service days (63)

As a result of these strategies, more demand was present during PROGRESS's vasectomy scale-up program than could be accommodated, even years after the initial Capacity Project activities had ended (63).

The ACQUIRE project, led by EngenderHealth, led successful a communication campaign called "Get a Permanent Smile" in several low-resource settings. Our search identified documents related to the campaign in Bangladesh, Ghana and Honduras. The campaigns in these countries countered pervasive myths and rumors about vasectomy. In Bangladesh, posters and television were used. Television broadcasts were staggered to coincide with seasonal periods of greater media attention. In doing so, the project was able to maximize the potential exposure to the campaign and avoid wasting valuable resources. In Ghana, the communications strategies included television and radio ads on vasectomy, an informational "hotline," and community outreach. In Honduras, communication materials included 30-second radio commercials, posters, brochures, and billboard designs (64). The communications strategies resulted in significant increases in the number of vasectomy users in all three countries. However, in Ghana, demand seemed to naturally decline over time when there was no additional communications support but would quickly increase during periods in which the campaign messages were rebroadcasted (65). And, like the campaigns in Ghana, demand was not sustained in Honduras. Once promotional support ended, the demand for vasectomy dropped significantly. This highlights the important link between mass-media promotion and uptake of vasectomy services.

The "Permanent Smile" campaign aimed to dispel the myths associated with vasectomy; eliminate the stigma associated with the procedure; improve male involvement (especially men's interest in, knowledge of, and participation in FP); and encouraged dialogue between potential clients and providers.

Employer-based promotion

Engaging men in discussions on FP and their RH, as well as that of their partners, can be challenging, particularly when men are faced with multiple competing priorities and seldom attend regular clinic visits. That is why some programs found it beneficial to engage men and promote male involvement in RH where the men are, for example in the workplace. During the RESPOND Project's 18-month employer-based vasectomy promotion campaign in India, 10 companies representing a variety of sectors, ranging from waste management to manufacturing to beverage bottling, participated in the project. The employers supported the intervention by providing a venue for project activities and by allowing employees to attend activities during normal working hours. Key features of the intervention included:

- Developing and distributing printed materials, including posters, brochures, and self-standing poster displays that provided employees with FP information, with a focus on LAPMs
- Orienting 27 health coordinators from the participating businesses on FP, particularly LAPMs, and on interpersonal communication skills for discussing FP use with interested employees
- Implementing 61 health talks, which included an orientation to FP and an in-depth discussion of LAPMs
- Staffing health desks placed in a well-trafficked area of the company with a RESPOND program officer or a trained counselor, distributing materials, and answering questions about FP
- Identifying referral sites that provide high-quality FP services, including LAPMs
- Providing referrals to interested clients through a phone hotline and project staff

As a result, employees who participated in the intervention reported a stronger intent to use FP, particularly LAPMs, in the future compared to employees who did not participate in the intervention (96 percent versus 60 percent, respectively). Additionally, 85 percent of employees who participated in the intervention reported talking to their spouse about FP compared to 51 percent of those who did not participate in the intervention (66). Greater exposure to the intervention increased use of LAPMs among prior FP users and increased rates of FP adoption among prior non-users. The authors noted that discussion of FP was lower among married participants without children than among those with one or more children.

A group counseling approach

Encouraging couples to openly discuss the use of FP, particularly LAPMs, can be challenging, particularly when an intervention solely focuses on engaging one member of the couple. Providing information to couples in a group setting may be beneficial to promote FP dialogue between partners. One evaluation of a group counseling technique conducted in the Philippines demonstrated its effectiveness as a means of promoting open discussion about NSV and improving knowledge and acceptability of the method among potential users (67). Group counseling improved knowledge of and attitudes about FP among men and women, specifically husbands and wives. The authors argued that as participants interacted, argued, agreed or disagreed about certain issues, they encouraged each other to practice particular FP methods. They noted that the advantage of having couples together in the session was that after being

exposed to the same information about FP methods they were then able to discuss their own plans and make a decision together (67).

Media costs

Documents related to the ACQUIRE project's "Permanent Smiles" campaign provide some insight into the costs associated with rolling out effective vasectomy media campaigns that also address gender norms (64, 65, 68). The campaign in Ghana (described earlier) included mass media placements on the nation's two leading television channels and a number of local radio stations, community activities, and the production of printed materials (brochures, leaflets, and posters) distributed to site-level staff and in public places where men were easily reached (e.g. bars and garages). All of these efforts were priced at US\$85,700 (65). During the initial 2004 marketing period, there was a threefold increase in the number of vasectomies performed in the participating clinics compared with the previous year (26 vasectomies in 2003 compared with 81 in 2004). After the campaign ended there was a significant decrease in the number of vasectomies performed at the clinics. In 2008, ACQUIRE relaunched the Ghana media campaign but scheduled the mass media broadcasts to appear periodically over a four-month period. During the 2008 campaign, there were 25 percent fewer television spots and 30 percent fewer radio spots than in 2004, and the number of printed items were also reduced. Following the relaunch, the number of vasectomies performed at the participating clinics more than doubled. The total cost in 2008 for purchasing the mass media airtime and printed materials was about US\$54,500 — roughly two-thirds of the investment made in 2004 (65).

ACQUIRE's media campaign in Honduras (also described earlier) included a 30-second radio spot aired 14 to 20 times per day for three months and the development, printing, and distribution of approximately 2,000 vasectomy posters, 10,000 brochures, and two billboards situated at major crossroads in the two major cities involved in the program for four months. The total cost of the campaign (excluding the costs of outside technical assistance) was US\$25,026 (64). Additionally, the MOH presided over the publication of 10 articles and editorials related to vasectomy, which aided in advancing the campaign messaging to the medical community at an estimated value of US\$12,000. Also, a local newspaper published a series of articles about NSV in its health section, as well as the printed images of the campaign poster, resulting in additional free advertisement for NSV and the campaign. The number of vasectomy users went from 14 in 2004 to 92 by the end of the launch year, 2005; then numbers decreased as promotional support dwindled.

In ACQUIRE's communication campaign in Bangladesh, a total of US\$101,000 was allocated for production materials, agency fees and media costs (68). The campaign ran periodic television advertisements (stopping during typhoon season) on the country's national channel and printed 100,000 posters that were put up in tea shops, barber shops, and marketplace centers. In addition, health service providers complemented the mass media campaign through interpersonal communications and community outreach, discussing vasectomy during their regular community visits. Following the campaign, a multistage cluster survey was conducted among the primary audience — men in two districts where the campaign was implemented. Of the 320 men surveyed, 74 percent were aware of vasectomy, of which 95 percent had heard information on or seen a message about NSV in the past

year. With increased awareness in these districts came a 15 percent increase in demand (based on district-level increase in the number of vasectomies performed) during the first full month of TV support as compared to the previous year (68).

Costs of media varied depending on the country, type, duration, and range of media coverage and the estimates included in the literature excluded the technical assistance provided by outside agencies in developing and refining the messaging. According to these estimates, however, media costs in these low-resource settings are relatively minimal compared to private-sector marketing, which can range into the millions of U.S. dollars. These estimates, however, are based on small-scale pilot campaigns; more research needs to be done in estimating the costs related to scaling up media coverage of future NSV and gender transformative messaging.

Supply of services

Provision of high-quality vasectomy services must include adequate infrastructure, supplies and equipment as well as well-trained, skilled, motivated, and supported staff. It is also important to have administrative, financial and management systems in place that are accountable to the communities they serve. Here we describe examples related to the supply of vasectomy services including the use of evidence-based vasectomy techniques, training of providers and engagement of lower-level health staff in vasectomy services and referrals, a capacity building cascade approach, and mobile outreach and decentralization of services. This section also includes specific information on service delivery costs related to provider training and the latest evidence-based occlusion techniques.

Use of evidence-based vasectomy techniques

Each of the programs identified in this document review trained providers on NSV, highlighting the recent emphasis and practicality in low-resource settings for using this method to access the vas deferens. Various methods were used by the different programs for occluding the vas once exposed; however, in their review and evaluation of Asian vasectomy programs, Labrecque et al. (2005) noted that most vasectomies were performed with NSV and simple LE technique for vas occlusion. The same is likely true in most other low-resource countries as well, due to the paucity of service delivery in most of these settings, though to date no thorough review has been conducted.

From 2003 to 2004, the ACQUIRE project visited vasectomy centers in Cambodia, Thailand, India, Nepal and Bangladesh in order to observe vasectomy techniques used in each of these countries and to demonstrate the novel occlusion techniques using hand-held, battery-powered cautery devices and FI (9). Investigators also conducted interviews with key informants in each country to gauge interest in the use of thermal cautery and/or FI techniques. The FI technique was largely known and even taught in the Asian countries visited but was seldom performed in India, Nepal and Bangladesh. Insufficient surgical skills, the additional time needed to perform the technique, and FI not being mandatory according to country standards were frequently cited reasons for not adopting the technique. Providers showed great interest in the use of thermal cautery for vas occlusion, though the authors note that introducing cautery with FI may be associated with the same implementation barriers encountered with

introducing FI on a large scale, plus the additional barriers related to new direct and indirect costs of the cautery device (9).

Whole, on-site training of providers and engagement of lower-level health staff

Beginning in 2005, FRONTIERS and local partners in Guatemala developed a systemic model to introduce vasectomy into MOH hospitals and maternity clinics based on prior vasectomy integration work done by the Mexican Social Security Institute (69). The model used by FRONTIERS in Guatemala involved training the entire health team — including surgeons, nurses, receptionists, and others who might provide referrals — at facilities interested in providing the services (a “whole-site” approach) on at least the theoretical aspects of vasectomy, providing counseling and information for potential clients identified by the health teams, and providing on-site practical training for physicians (performing supervised vasectomy procedures). The theoretical training of the entire health team resulted in greater general knowledge about vasectomy. However, in a post-training survey, knowledge gaps remained regarding the use of contraception for the first three months or 20 ejaculations after the procedure, and the typical characteristics of vasectomy clients (70, 71). In all, eight physicians — three general practitioners and five obstetrician-gynecologists — completed the practical training and were certified as vasectomy providers. Providers required an average of 3.8 training sessions and 8.3 vasectomies to be certified. Trainees’ self-confidence in performing the procedure along with trainer evaluations were used as criteria for certification (71). Follow-up visits one year after the end of the project showed that the four hospitals and maternity clinics continued performing a similar number of vasectomies as during the project period. After the end of this project, the MOH used the systemic model to introduce services in four additional hospitals and planned to scale up training activities to six additional hospitals and maternities (70-72).

Likewise, the ACQUIRE Program in Ghana offered whole-site trainings to establish “male-friendly” services, in which all health staff were trained on NSV counseling and services (65, 73). Compared to a baseline assessment conducted before the training, the whole-site training resulted in staff being more receptive to offering men’s health services, a better understanding of male anatomy, fewer misconceptions about vasectomy, and more comfort in talking to men about vasectomy. The project also provided follow-up training and continual provider supervision (65).

The concept of the whole-site training approach can also be extended to outreach workers for vasectomy services. A peer-reviewed article reported assessing CHWs’ knowledge of vasectomy and the effect of NSV orientation activities in Jharkhand, India (31). Before the orientation, the majority of CHWs had several misconceptions about vasectomy side-effects (e.g. ability to ejaculate post-vasectomy, losing strength), which significantly improved after the orientation (31). Only knowledge was assessed in this evaluation; however, the authors note that since CHWs are the only source of health information for men in this area, improving CHWs’ knowledge about the procedure and the potential side effects should increase men’s acceptance of vasectomy.

Task shifting

As an example of task-shifting vasectomy provision to lower-level health providers, one peer-reviewed article discussed training junior-level doctors to perform vasectomies in South Africa (57). The study

evaluated the safety and efficacy of vasectomy performed under local anesthesia by junior physicians at a secondary-level hospital as part of a free FP service. From 2004 to 2005, junior-level physicians performed 479 vasectomies. Procedure times and complication rates were analyzed to assess the capacity of the physicians to perform the procedure. The procedural data for junior-level staff was not compared to those of more senior-level (i.e. experienced) surgeons in this article; however, in comparing the first one-third of procedures performed by each of the study physicians with the last one-third, there was a significant decrease in average operating times but not in complication rates. This implies that there may be a “learning curve” when considering task-shifting vasectomy services to more junior-level staff, which may affect the average operation times, but there is little data on how experience (in terms of the number of procedures performed) may affect complication rates. Regardless of the static complication rates, the authors concluded that junior doctors could safely and effectively perform vasectomy as an outpatient procedure.

Some countries, such as Malawi, have already begun task-shifting provision of long-acting methods, such as intrauterine devices (IUDs) and implants, to outreach staff (74). Allowing CHWs to provide a wider array of services may allow more technically skilled providers the greater availability to offer more permanent methods to clients who have reached their reproductive goals (24, 25, 34).

Capacity-building cascade

In order to systematically and cost-effectively build the capacity of clinics and service providers, many past vasectomy programs relied on a cascade approach to training (63, 73, 75). Program implementers would identify a small group of motivated providers and health staff to offer vasectomy-service training. Once trained, a strategically selected cadre of these initial providers were then trained as trainers, with the long-term goal of diffusing the knowledge and training to other clinics and providers after the program ended.

The Capacity Project’s pilot NSV training program in Rwanda trained selected physicians and nurses in the NSV procedure and provided the surgical training equipment and supplies. They used a training curriculum based on established procedures (76, 77) and a skills checklist to standardize assessments and assure quality training. To aid in the sustainability of the program, the project trained three physicians and four nurses as trainers who could then train other health teams in other clinics. The project also supported vasectomy teams to make outreach visits from the hospital to six health centers. The physicians and nurses trained as trainers instructed seven other physicians and 10 nurses at hospitals in four additional districts. By June 2009, 16 nurses and six physicians were fully validated to perform the procedure without assistance from another professional. Project-trained physicians and nurses performed 390 NSVs in Rwanda, 56 percent of them at health centers.

Building upon the Capacity Project’s work, the Rwanda MOH, with technical assistance from PROGRESS, decided to update provider training by training three Rwandan physicians to become vasectomy master trainers in NSV with thermal cautery and FI in 2010. In February 2010, three physicians previously trained in NSV were selected to participate in the training of trainers (TOT) for delivering NSV with thermal cautery and FI. Over a five-day period, the trainees shared their collective experience with the current vasectomy technique, reviewed evidence on various occlusion techniques, watched videos demonstrating thermal cautery with FI, manipulated the cautery device and tips, discussed how to integrate the new technique into their practice (including how to sterilize materials),

and practiced the technique on volunteer clients under the direct supervision of an international vasectomy trainer. Trainees were instructed to evaluate each others' performance using a simple procedural checklist as part of the TOT. After each vasectomy, the trainer and trainees compared notes that were captured on the checklist to evaluate the trainees' performance (11). A total of 67 men received vasectomies over the five-day training (11 to 16 per day) and all three trainees successfully mastered the new occlusion technique (11). This relatively short time span required for training the physicians may have been due to their prior experience with NSV through the Capacity Project and the high demand for vasectomy as a result of previously mentioned community-based promotional activities under the Capacity Project and PROGRESS.

Based on this promising initial experience and local demand, the Rwanda MOH decided to expand access to this new vasectomy technique with the goal of training at least two doctors and three nurses in each of the 43 district hospitals to provide NSV with thermal cautery and FI (63, 75). Meetings were held between the PROGRESS team, the MOH, and the National Family Planning Technical Working Group to develop a comprehensive implementation plan to offer training and services nationwide. Initially, eight doctors and 10 nurses completed TOT courses. Then, through the subsequent cascade of instruction, a total of 64 doctors and 103 nurses were trained in 42 hospitals across all 30 districts in Rwanda to provide vasectomy (75). Between 2010 and 2012, 2,523 vasectomies were performed by doctors trained as a result of this initiative. At each of these sites, more clients were available than could be accommodated (63), highlighting the success of past vasectomy promotions in the area and the strategic selection of training sites that offer sufficient numbers of clients.

Mobile outreach teams may significantly increase the uptake of vasectomy in hard-to-reach places.

Mobile outreach and decentralization of services

Several programs utilized mobile outreach teams to further the reach of vasectomy service provision. A key contribution to the success of the NSV program in Rwanda was the extension of service from hospitals to health centers. As mentioned earlier, 56 percent of vasectomies performed in a sample from one district were conducted at a health center (45).

Between 2010 and 2012, a RESPOND project team carried out desk reviews, structured assessments (meetings, interviews, and observations of mobile outreach services), and key informant interviews in Tanzania, Nepal, and Malawi to assess the extent and impact of mobile outreach LAPM services offered in these countries (74). The authors noted that most mobile outreach services — defined as “mobile teams of trained providers operating in an area with limited or no FP or health services” — were temporarily provided at static public-sector health facilities. In some cases, mobile teams used community centers, schools or churches, or set up more portable health tents or used vans to offer services.

Another article assessed the impact of mobile clinics in improving vasectomy access and uptake in Nepal and found that male sterilization in Nepal (particularly in remote locations) had a significantly higher odds of happening in a mobile clinic than in a government hospital (58). Mobile services in Nepal have historically focused on voluntary surgical contraception (VSC) (i.e. female and male sterilization). “VSC camps” were introduced in the mid-1970s (the term “camps” communicating the temporary

nature of the service sites) and continue to this day. Over the years, the Government of Nepal has used two approaches to provide mobile outreach services for VSC to rural areas of Nepal: 1) a trained surgical team from outside the district would travel to district health care facilities that do not offer VSC to their clients and bring with it any equipment and supplies that were unavailable at the local sites; and 2) a trained surgical team would travel from the district center to areas that do not have VSC services and perform surgery in temporary medical settings, such as schools and community centers. In the latter approach, the team would still bring with it almost all of the necessary equipment and supplies it would need but would use the tables, lamps, and other items already available at local sites (74).

Mobile outreach clinics may significantly increase the uptake of vasectomy in hard-to-reach areas, but care must be taken to ensure adequate demand for services at each venue during the time that the services are being offered. Ensuring demand for services is essential to reduce the likelihood of staff turnover and/or reduction in the technical skills of the surgical or counseling staff. Before an outreach event in Tanzania, volunteers often announce it using megaphones, drums, and whistles in areas surrounding the facility (74). Churches, mosques, ward development committees, and other community groups may also publicize the event. Wickstrom and colleagues from the RESPOND project noted that community mobilization engages communities in discussing FP; informs clients about all methods, including LAPMs; and ensures enough of a caseload of LAPM clients to make the outreach visit worthwhile (74).

Tools to assist vasectomy program planners

We identified a handful of tools created to assist vasectomy program planners and providers in offering vasectomy services (61, 76-78).ⁱⁱⁱ The ACQUIRE project developed two training curricula that were designed to instruct physicians and vasectomy assistants to provide safe and effective NSV services (76, 77). One of the documents contained a curriculum on counseling clients to help them make a voluntary, informed, well-considered decision; verifying informed decision-making and consent; preventing infection, and managing complications, as well as supplemental materials on developing, maintaining, and publicizing a vasectomy service (76). The second provided guidance for organizing and conducting training on NSV. It emphasized the specific information needed to provide safe and effective NSV services and acknowledged that training may require extensive practice time. The authors noted that ideally trainees would bring prior skills, knowledge, and self-motivation that would aid in the training — highlighting the importance of strategically selecting appropriate service providers to offer the technical procedural training. In many areas, NSV services are provided as part of a team effort; thus, this course included instructions for training vasectomy assistants as well as physicians (77).

EngenderHealth published a checklist of the minimum number and types of medical instruments and supplies needed for provision of hormonal implants, IUDs, female sterilization, and vasectomy (78), which could be informative in future vasectomy programs.

The Johns Hopkins Information and Knowledge for Optimal Health (INFO) Project created a set of tools, checklists, and tables for program implementers and FP providers to 1) counsel individual male

ⁱⁱⁱ Due to our search criteria, this is not a comprehensive list of all available tools and training curricula related to vasectomy.

clients about vasectomy to ensure that they make an informed choice, 2) identify men with conditions that require a delay or special consideration before they can have a vasectomy, 3) explain the vasectomy procedure, 4) try to make sure that the client makes his own well-considered decision, and 5) explain to a man what he should do before and after the vasectomy (61). Our search did not identify any tools or guidelines to provide couples' counseling, but one article we reviewed references use of a group counseling technique involving couples (67). Another INFO Project toolkit informs FP/RH program managers about the benefits of vasectomy and considerations for vasectomy integration (62). Both tools would be helpful in future vasectomy advocacy and training efforts.

Service delivery costs

Provider training

Cost assessments of NSV provider training were included in a number of program documents included in our review (12, 45, 70-72). The whole-site training approach utilized by the FRONTIERS program in Guatemala, wherein surgeons, nurses, receptionists and individuals in neighboring health clinics providing FP referrals were all trained at least on the theoretical aspects of vasectomy, came with a total price of US\$43,355. This total cost included salaries, travel, per diem, and printing costs for training and promotional materials. In total, 10 providers were certified to provide vasectomy at six hospitals, and 24 nearby health centers and posts were trained to serve as referral centers for clients. The average cost per trained provider was approximately US\$4,335 (total project cost divided by total number of trained providers). In each of the 30 health units, health teams were trained on the theoretical aspects of vasectomy. In total, health team participants included 105 doctors, 91 nurses, 386 nurse auxiliaries, 20 social workers, and 122 other employees such as statisticians, secretaries and doormen (70-72).

The Capacity Project in Rwanda took a slightly different approach, and developed a TOT program for NSV. The total project cost, which included staff time, curriculum development, medical and training supplies, and surgical equipment for facilities and mobile teams in seven districts, was nearly US\$105,000. Cost per health worker (doctor or nurse) trained in the Capacity Project was US\$4,780 (total project cost divided by total number of trained providers). The authors noted that a significant portion of this cost was related to training the initial cohort of doctors and nurses, which necessitated bringing in experts from other countries to conduct the trainings. As described earlier, members of this initial cohort then went on to train additional health workers at considerably less cost. The authors suggest that future trainings of health workers in Rwanda would be cheaper given the number of trained trainers that are now available in the country, which would eliminate the need to bring in more expensive outside expertise (44). The authors also noted that the on-site training of the health care staff in this pilot project was slightly below the average cost of US\$5,000 to US\$7,000 per trainee for sending a doctor to be trained in other countries (44, 71).

Thermal cautery and fascial interposition

After accounting for the upfront cost of training staff and providing the necessary commodities to perform the procedure, NSV alone or NSV with thermal cautery and FI was more cost-effective (i.e. the

cost per CYP is reduced) than simple LE if offered within a robust vasectomy program (i.e. a minimum of 20 vasectomy clients per month per clinic) (12). The additional cost of adding thermal cautery was reported in two publications and was estimated to be between US\$0.38 and US\$0.42 per vasectomy (11, 12). It was summarized by several recent articles that these improved occlusion techniques could be initiated (11) and brought to scale (63, 75) in low-resource settings.

Enabling environment

Sociocultural, economic, and policy factors influence health services and social norms related to FP and vasectomy. An enabling environment for vasectomy requires engagement of governments, communities, and civil societies to support and advocate for gender equitable norms, accountability, evidence-based policies, and high-quality vasectomy services. Here we describe examples of creating an enabling environment for vasectomy including engaging religious, community, and political leaders; using gender transformative messaging; and using needs assessments and formative research to strengthen health services.

Engaging religious, community and political leaders

Gaining the support and public endorsement of religious and community leaders/institutions proved to be greatly beneficial in improving public attitudes toward vasectomy in several countries and programs. For example, the ACQUIRE project noted that in Tanzania, Seventh-day Adventists were strong advocates of all forms of contraception, including vasectomy, and would even include information on contraception in their sermons (35). The Heri Seventh Day

Adventist Mission Hospital in Tanzania, a focal point of the project's vasectomy promotion and training activities, provided vasectomy services and educational seminars about the benefits of contraception (35, 36). This hospital offered to host and support a regional center of excellence in NSV and provided the majority of vasectomies in a six-year period in the Kigoma region of Tanzania. In addition, a vasectomy surgeon reported that Anglican religious leaders helped disseminate information about his mobile clinic that offered vasectomy services, which he occasionally held at a Pentecostal health clinic (36).

In Bangladesh, the ACQUIRE project produced a book entitled *Family Planning in the Eyes of Islam*, designed to engage influential imams (Muslim religious leaders) in encouraging FP, with a focus on LAPMs, and demonstrating the acceptance of FP in the holy Qur'an and Hadith, Islam's two foremost sacred texts. In addition, the ACQUIRE project sponsored interactive community forums, largely held in rural areas of Bangladesh, that brought together imams, teachers, businessmen, local politicians, and local FP services providers to discuss FP and the important role of LAPMs (68). The engagement of religious leaders in Bangladesh may have contributed to the high percentage of men in a post-campaign community survey, conducted in two of the campaign's target districts, agreeing that vasectomy was a trusted form of FP (68).

Having supportive religious denominations helps promote and provide vasectomy.

In a review of FP programs over the past four decades in the Islamic Republic of Iran, Simbar (2012) cites that gaining religious and political leader support was fundamental to create a supportive environment for FP, and in turn vasectomy services. After a population census was conducted in 1988, which highlighted increasing demands on food, health care, education and employment opportunities, top-level policymakers became more aware of the urgent need to provide voluntary FP. Religious and opinion leaders were engaged in this process to ensure their support for the FP program (79).

Gender transformative messaging

The “Get a Permanent Smile” campaign (as previously described) aimed to dispel the myths associated with vasectomy, eliminate the stigma associated with the procedure, improve male involvement (especially men's interest in, knowledge of, and participation in FP), and encourage dialogue between potential clients and providers (68). In Bangladesh, the campaign directly addressed entrenched gender norms about male involvement in a couple's RH. Creative materials including posters and television commercials were developed that contained the message “My husband is best,” which was highly regarded among male and female focus groups alike. Men liked the fact that the materials clearly illustrated their role in FP decision-making and the notion that a wife would value the husband's involvement, and female focus groups identified with the pride that was expressed by the wife in the materials. The materials challenged frequently cited concerns about vasectomy, encouraged vasectomy clients to promote vasectomy in their communities, and highlighted the importance of couples making informed joint decisions about their RH goals.

Men liked the fact that the materials clearly illustrated their role in FP decision-making and the notion that a wife would value the husband's involvement.

In Honduras, Taylor (2008) describes the demand-side interventions initiated in 2004 through the “Permanent Smiles” campaign aimed to reposition vasectomy as a simple and effective male method of FP (64). Participants from the target audience (i.e. men from middle-income and low-income socioeconomic groups between the ages of 25 and 45 with at least two children) were recruited for focus group discussions to determine the participants' knowledge and awareness of vasectomy services, the myths and misperceptions they held about vasectomy, their reactions to and thoughts about key facts about vasectomy, and their perceptions of service-delivery sites. Key messages included how vasectomy does not affect a man's sexual performance and emphasized couple's communication and that vasectomy would not affect a couple's relationship.

In Ghana, the ACQUIRE project's vasectomy promotion included an emphasis on the benefits on vasectomy and promoted “satisfied users” through testimonials. Vasectomy was promoted as a FP method that gives a man the ability to care for his partner and children, while offering the freedom to enjoy life (73).

Strengthen health services through needs assessments

Site needs assessments and formative evaluations of provider knowledge and acceptability were frequently conducted as one of the initial steps in introducing NSV services (31, 68, 80, 81). Formative research allowed program planners to assess the needs of clinics and mobile settings to promote and perform vasectomy services and to gauge the level of provider awareness, knowledge, and acceptability/bias toward vasectomy. For example, site assessments during the initial phase of the ACQUIRE project in Bangladesh found that frequent stock-outs of necessary materials and tools at facilities and a lack of information and literature about service availability in and around the intervention clinics needed to be addressed in order to encourage accessibility of services (68). In response to the deficiencies identified in this needs assessment, the ACQUIRE Program conducted on-site coaching of service providers. There was no formal evaluation of the impact of these efforts, but the program noted increases in the number of vasectomies performed compared to previous years and authors acknowledged that this trend may have been at least in part affected by the enhanced competencies of medical officers.

In India, formative assessments were used to gather information about community misperceptions about vasectomy as well as cultural and personal barriers providers and health staff may have had in openly discussing the method and procedures with potential clients and their partners (80). Results of these assessments were used to directly inform interventions that trained providers and outreach workers to give potential clients and their wives accurate information about the NSV procedure and its effect on sexual function. The program team oriented 600 health providers and outreach workers from 44 health facilities to the fact that NSV does not interfere with erection, ejaculation, and sexual pleasure. The project used a series of role plays and developed job aids (e.g. a schematic diagram of the male anatomy) to build health worker confidence in discussing these sensitive issues with the intended audience. Male workers discussed these issues with potential clients and female workers discussed them with spouses of potential clients. The authors noted that if the spouse of a potential client was convinced, then the chance of her husband accepting NSV was very high. As a result of their intervention, the NSV acceptance in the nine project districts of Uttar Pradesh increased three-fold over two years. This illustrates how a needs assessment of vasectomy acceptability in communities could lead to the creation of a supportive environment, promoting greater vasectomy uptake (80).

Conduct needs assessments and formative research to understand local barriers, misinformation, opportunities and channels for promotion.

Discussion

This review offers insights from the past decade to advance vasectomy uptake worldwide. It capitalizes on the experiences and evidence of recent vasectomy programs to identify factors that can improve demand for and sustain an adequate supply of male RH services. We did not attempt to assess the effectiveness of the recommendations or strategies outlined above. Vasectomy integration into national FP agendas is the next step toward developing a robust method mix and the proper opportunity to assess the impact and effectiveness of the strategies mentioned. A central theme to the vasectomy literature, and that of all FP methods, is that creating a continual demand for services and access to and supply of well-trained health teams are mutually reinforcing components to a successful vasectomy program. In addition, there is an underlying need for an enabling policy, cultural, and gender environment that extends beyond vasectomy and addresses male health, in general. Based on previous work, the literature and our experiences, we present our ideas to best promote and support vasectomy.

Creating continual demand for services and access to and supply of well-trained health teams are mutually reinforcing components to a successful vasectomy program. In addition, gender equitable norms and a supportive policy and financial environment need to be in place to encourage a conducive environment for sustainability.

Demand creation

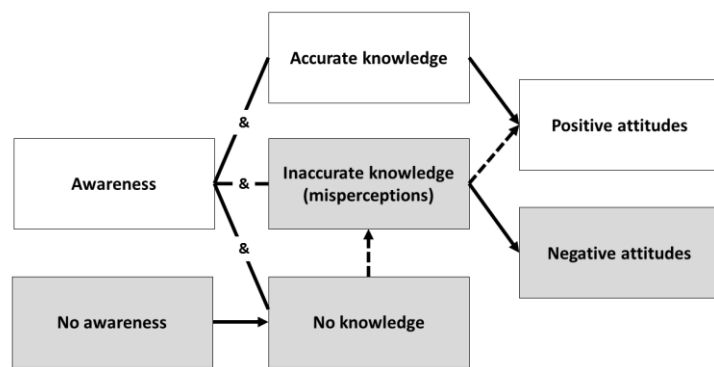
In general, almost all of these articles found that men, women, and many health service providers had low awareness of and/or several misperceptions about vasectomy. Figure 1 theorizes that, at an individual level, awareness and accurate, or inaccurate, knowledge of vasectomy directly influence user attitudes toward the method. Note that individual awareness and knowledge are both influenced by external sociocultural and structural factors not illustrated in the diagram. According to behavioral theory in general, awareness, accurate knowledge and positive attitudes are essential predisposing factors to the uptake of specific behaviors but are not sufficient to foster uptake alone.

Low knowledge or misperceptions about vasectomy lead to negative attitudes, which negatively influence acceptability of vasectomy. However, accurate knowledge of vasectomy coupled with positive attitudes are motivators for people to eventually accept vasectomy or consider the use of vasectomy as a viable option for limiting births when they feel the time is right. In this review, we found that countering existing misinformation and lack of knowledge about vasectomy was key in order to increase demand for services. We found that formative research was often conducted early on to understand local knowledge and acceptability of potential clients and their partners. Targeted messaging and educational materials were then developed to directly address misconceptions and lack of knowledge about the vasectomy procedure and side effects. In many cases, multiple media were used to reach the target audience, and satisfied users were encouraged to dispel rumors and misconceptions about the procedure in their communities at a grassroots level. Most salient for many men and women was the personal accounts/experiences of vasectomy clients. Testimonials dispelling myths were well-received across settings and mentioned as key aspect of attitudinal change and helped to bridge the RH gap for men. This is similar to activities from the voluntary medical male circumcision activities in East Africa, which utilized marketing campaigns that depicted satisfied users (men and their partners). Coupling testimonials with data, like those from PROGRESS, reflect that increases in frequency and quality of sex between partners could be a strong message to many couples looking to limit family size. In addition to mass media and interpersonal communication, many men in our review heard about vasectomy through health care workers, which highlights the importance of health care workers at all levels being trained to counsel men and women on vasectomy as a contraceptive method. Many programs cited how spikes in vasectomy uptake corresponded directly to exposure to mass media or community-based promotion. Likewise, decreases in vasectomy uptake were associated with lack of promotion efforts. Therefore, programs have to decide what resources they want to allocate to mass media and how and when to deploy these promotion efforts.

Despite the demand-creation achievements of all of the programs included in this report, more needs to be done in many of these settings to increase the RH awareness of men and boys in general. Advocacy efforts should target adolescents and men in their 20s to take a more active role in their own RH, rather than relying solely on women to bear the burden of a couple’s reproductive potential. This includes encouraging young men to start thinking about getting a vasectomy once they have reached their desired family size, not just

advocacy efforts solely targeting men and couples who have already reached — and in many cases surpassed — their desired family size. Emphasizing the safety of the procedure, the money-saving potential of having fewer children, not having to spend money on contraception, and the health benefits to the woman (avoiding unintended pregnancies and side

Figure 1. Knowledge, Acceptability & Attitudes



effects or complications related to contraception) could be salient messages that help motivate men to consider getting vasectomies when the time is right. However, attempts to focus communications efforts on men should not ignore women as important agents in the decision-making process.

Some documents highlight the concerns that women have that vasectomy may reduce their partner’s desire for sex and that they, instead, offer to undergo sterilization to avoid any change in his sexual behavior.

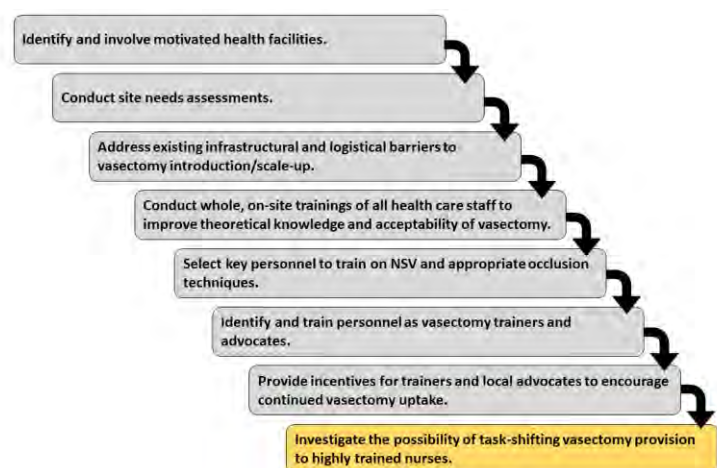
Supply of services

A “whole-site” training approach has been documented to improve engagement of health care staff at all levels to promote vasectomy services. Stronger public-private partnerships will enable sites to initiate capacity-building activities among their staff. At a minimum, all staff (including outreach workers, counselors, and administrators) should be provided with theoretical knowledge of vasectomy. From there, clinical staff should be trained to offer the most effective method of vasectomy available given financial and logistical constraints. Continuous in-service trainings and quality-assurance protocols should be used. Several tools are available to assist in quality assurance of training and service provision (61, 62, 76-78), much of which has been consolidated and made publically available through the K4Health Permanent Method Toolkit (82).

A cascade approach to initiating and building capacity to scale up NSV services has been demonstrated to be successful in a number of small pilot programs across the various USAID cooperative agreements identified in our review. Figure 2 summarizes the various steps future programs should perform (at a minimum) to develop a successful NSV training program and potentially sustainable supply of NSV services.

If possible, we recommend creating multiple training sites throughout the region, and at various health care facility levels (e.g. district hospital, primary care facilities). These may begin as temporary/“mobile” training sites, for logistical or financial ease, but careful monitoring of demand in the areas should be conducted to determine if any of these sites could become more static training facilities. By maximizing the number of vasectomy training sites across the country, programs can hope to increase vasectomy awareness among potential clients, while also providing training to physicians who may otherwise (because of logistical constraints) not be able to gain experience with the procedure. However, care must be made to address operational problems, such as ensuring instruments are properly sterilized and clients arrive on time to the training

Figure 2. Cascade Model for Building Capacity



sites. These issues may be amplified as a consequence of continually moving training sites, which could detrimentally affect user satisfaction, safety of the procedure, and access to service. Thus, once established, it is recommended that these sites become “hubs” for vasectomy training and sources of continual support for vasectomy staff in the region.

In addition, programs should focus on building off past programmatic successes in offering vasectomy and LAPM programs. The success of Rwanda’s scale-up of NSV throughout the country was predicated by earlier success in developing a provider training curriculum under the ACQUIRE project, successfully training a handful of physicians on NSV and NSV trainers under the Capacity Project, and finally PROGRESS’s assistance to the MOH to update the curriculum to include more effective occlusion techniques and to bring the service to scale. According to the Rwanda MOH 2012-2013 Annual Report (83), all hospitals currently have the capacity to provide long-term methods, including surgical methods like vasectomy and tubal ligation during routine and outreach strategies; however, to our knowledge no national-level evaluation has been conducted to assess the uptake of vasectomy services since the last demographic and health survey (DHS) report in 2010. Utilizing a cascade approach to build NSV services and whenever possible building off of earlier successes and existing knowledge about provider-centered method delivery will likely greatly improve bringing programs to scale in other countries.

Getting vasectomy clients to return for post-vasectomy semen analysis roughly three months post-operation may continue to be a challenge for future programs, which will make evaluating occlusion effectiveness, particularly over time, difficult. Patient follow-up and accessibility of post-vasectomy care in case of pain or other problems is often difficult because few men return to the clinics after the procedure. More research needs to be done regarding effective methods for assessing occlusion effectiveness outside of the clinic setting and for offering post-vasectomy care and follow-up when needed through the use of outreach health care workers.

It is critical that demand for and supply of vasectomy services be mutually reinforced. For example, if demand dwindles, providers will not have clients and then may lose desire to or confidence in their ability to perform vasectomies.

Enabling environment

One of the greatest challenges to program sustainability is lack of political and financial support. Local policymakers need to be convinced of the importance of a male RH agenda, most immediately the inclusion of vasectomy into a comprehensive method mix. Without continuous support from local governments, programs that once held great promise will not be sustained. Lack of funding will hamper service delivery and marketing efforts. Lack of demand and support will cause trained providers to lose their motivation, expertise, or comfort to perform the procedure. Therefore, it is important to have overarching systems and policies that are supportive for long-term sustainability of vasectomy programs. As in all health programming, continual quality assurance is an important component to maintain provider and client confidence and satisfaction.

Addressing and changing current gender norms through social and behavioral change strategies is critical to facilitate couples’ communication, shared decision-making, and use of more gender-equitable FP practices. Gender norms associated with vasectomy are compounded at both the personal

and the facility levels. Research has repeatedly found that both men and women perceive FP to be women's responsibility, despite men's control of most decisions within the household. These roles are reinforced in the standard practice at health facilities. Men, who are far less likely to use health services in general, are not counselled or a target population for most FP campaigns. Successful integration of vasectomy, and increases in overall CPR, will be directly influenced by how men are engaged by health campaigns and facility workers. Our review revealed a number of potentially beneficial approaches to improving gender equitable norms, including targeted promotional campaigns that emphasize that male engagement in RH and use of available FP options is characteristic of responsible male behavior, engaging couples in group FP informational sessions, and promoting FP and offering RH referrals to men at the workplace.

Active endorsement of vasectomy and male engagement in RH by religious and cultural leaders can improve public awareness and acceptance of vasectomy. Examples from our review in Tanzania, Bangladesh, and Iran highlight the important impact that religious endorsement can have on vasectomy uptake. Rooting active male engagement in religious and cultural belief systems can greatly facilitate the acceptance of vasectomy as a viable contraceptive option for couples.

At the policy level, an extension of the existing paradigm to include men as active members in the FP discourse is needed. To facilitate this expansion, government health agencies (if they have not done so already) need to establish policies and political infrastructure that strategically engage and include men in a comprehensive RH agenda, without undermining the gains made in improving access to FP for women. Men's health needs to become an institutionalized component in MOHs in order to facilitate future vasectomy program success. Developing both male and female RH agendas can contribute to achieving the same goals (e.g. a reduction in the number of unintended pregnancies among couples and the promotion of gender-equitable societies). Meanwhile, the international community must help to facilitate this paradigm expansion by developing new ways to monitor and evaluate the impact of male inclusion in FP/RH programming. For example, this includes re-evaluating how demographic data are collected, ascertaining better ways to engage men in FP/RH research and monitoring, and developing new metrics to comparatively analyze the impact of male-centered contraceptive methods (e.g. new CYP calculations for male-centered methods based on male reproductive potential, and the consideration of potential market characteristics of contraceptive method clients).

Future areas of inquiry

The following list outlines current gaps in the literature and practice of vasectomy in low-resource settings that should be prioritized in the future:

- Further advance post-vasectomy outreach. Invest in developing new technologies to allow community-based staff to provide follow-up services such as post-vasectomy semen analysis.
- Develop new metrics (e.g. CYP based on male reproductive potential or fertility intentions) to comparatively measure effectiveness of novel male-centered contraceptive methods.

- Include more men and more RH questions tailored to men in national RH monitoring and surveys, such as the DHS, to better understand male perspectives.
- Better understand motivations for limiting births among various groups (e.g. men younger than 30 versus men 30 and older). By understanding these varying motivations among differing demographics, we may be able to better market the use of permanent methods.
- Develop means of adding the use of permanent methods as a regular and logical part of the FP conversation. As fertility desires change throughout the course of a life, permanent methods should be considered a logical “final step” to ensure an individual or couple achieves their desired family size. We need to put the “plan” back into family planning.
- Elucidate the psychosocial effects of receiving a permanent method of contraception among men and women in order to better inform marketing and counselling messaging.
- Identify country-specific barriers and opportunities to access permanent method services (e.g. public awareness, misconceptions, gender norms, provider biases or service barriers).
- Identify types of interpersonal or community-level interventions or strategies that address strong cultural tendencies that support large family size and therefore make “limiting” a difficult option for individuals/couples, in order to create an environment in which choosing to limit family size is a viable option.
- Identify effective, evidence-based strategies to reform gender-related behaviors and social norms that hinder vasectomy uptake as well as, more generally, male engagement in FP.

Conclusion

Our findings provide tangible examples and lessons learned that will advance the male RH agenda worldwide. Creating continual demand for services and access to and supply of well-trained health teams are mutually reinforcing components to a successful vasectomy program. At the same time there is an underlying need for an enabling policy, cultural, and gender environment that extends beyond vasectomy and addresses male health in general. The FP/RH paradigm should be expanded to include men not just as default partners of female FP clients and potential advocates or deterrents of RH promotion, but as equal beneficiaries of FP/RH programs in their own right. Accelerating progress toward meaningful integration of vasectomy into a comprehensive method mix is only possible when political and financial will are aligned and support the logistical and promotional activities of a male RH agenda.

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Appendix I

The Population Council's **FRONTIERS Program** was a 10-year (1998-2008) cooperative agreement through USAID that brought together global research and development organizations including the Population Council, Family Health International (now FHI 360), and Tulane University School of Public Health and Tropical Medicine. The program focused on conducting operations research to improve service delivery and influence related policies with the aim to improve the delivery of FP and RH services in developing countries.

EngenderHealth's **ACQUIRE Project** was another global cooperative agreement supported by USAID (2003-2008). The project aimed to advance and support the availability, quality, and use of facility-based RH and FP services at every level of the health care system and strengthen links between facilities and communities. The ACQUIRE project was involved in efforts to integrate FP services with HIV, maternal health care, and postabortion care services; scale up services through networks; blend and scale up proven approaches for improving performance and quality; and promote "knowledge to practice" to improve program performance and effectiveness. The constructive engagement of men in RH was a core ACQUIRE Project strategy. ACQUIRE adapted strategies originally developed by EngenderHealth's Men As Partners (MAP) program, which looked holistically at men's engagement from the perspective of men as clients, as partners of clients, and/or as change agents. MAP was integrated into ACQUIRE's efforts to improve the acceptability, awareness, and use of vasectomy services (Bangladesh and Ghana) and was an important element of community interventions designed to improve access to postabortion care (Kenya), the IUD (Guinea and Kenya), and RH services for married youth (Bangladesh and Nepal).^{iv} Also through the ACQUIRE Project, EngenderHealth introduced the Supply-Demand-Advocacy (SDA) Program Model for FP/RH Service Delivery in a number of project countries, including Bangladesh, Guinea and Honduras, in order to synchronize these mutually reinforcing components to FP service acceptance (84).

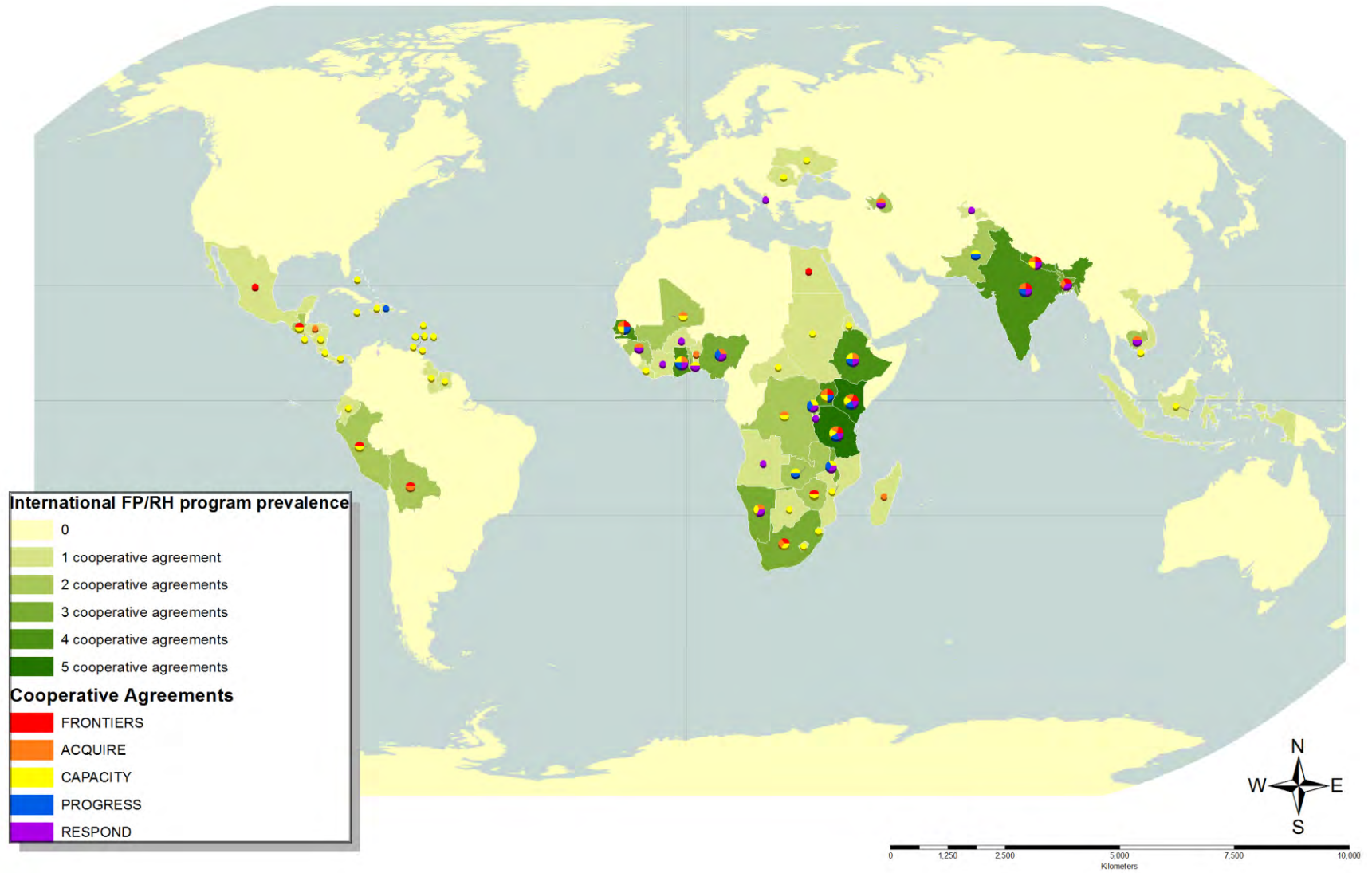
IntraHealth International's **Capacity Project** was a five-year (2004-2009) cooperative agreement funded by USAID that included partnerships with six other global organizations including IMA World Health, Jhpiego, Liverpool Associates in Tropical Health, Management Sciences for Health, PATH, and Training Resources Group. The project aimed to strengthen human resources to implement quality health programming in developing countries and focused on improving workforce planning and leadership, developing better education and training programs, and strengthening systems to support workforce performance and encourage health workers to remain on the job (85).

FHI 360's **PROGRESS** sought to improve access to FP methods and services among underserved populations in developing countries through research, research utilization, and capacity building. The five-year (2008-2013) cooperative agreement was funded by USAID. Technical areas of work included community-based FP, FP within drug shops, postpartum FP, integration of FP with non-health sectors, mobile technologies for health, expanding the contraceptive method mix, and capacity building and cross-cutting research utilization (86).

^{iv} For more information about EngenderHealth's MAP program, go to <http://www.acquireproject.org/archive/html/7-engage-men/index.html>.

The **RESPOND Project** was a large, five-year (2008-2013) cooperative agreement, extended for one year (through September 2014), funded by USAID and led by EngenderHealth. It included partnerships between FHI 360, Futures Institute, Johns Hopkins Bloomberg School of Public Health Center for Communication Programs, Meridian Group International, Inc., and Population Council. The RESPOND Project utilized the SEED Programming Model™ (a revision to the previous SDA Program Model developed during the ACQUIRE Project) as a holistic model to design, implement, and evaluate its FP programs. The project's primary objective was to advance the use of RH and FP services, with a focus on informed choice and voluntary use of LAPMs (87).

Global reach of USAID-sponsored FP/RH initiatives over the last 10 years



Appendix II

Documents included in the systematic review related to vasectomy, by region

Source	Title	Project	Country	Knowledge, Attitudes and Acceptability	User Characteristics and Perspectives	Service Provision	Summary
Global							
EngenderHealth 2007	No-scalpel vasectomy curriculum: A training course for vasectomy providers and assistants, 2nd edition. Participant handbook	ACQUIRE Project	Global			X	This curriculum is a clinical skills training course designed to train physicians and vasectomy assistants to provide safe, effective NSV services. Besides containing instructions on providing the NSV procedure, this course also contains information on counseling, informed consent, infection prevention, and management of complications, as well as supplemental materials on developing, maintaining, and publicizing a vasectomy service.
EngenderHealth 2007	No-scalpel vasectomy curriculum: A training course for vasectomy providers and assistants, 2nd edition. Trainer's manual	ACQUIRE Project	Global			X	This curriculum on NSV is a clinical course designed to train physicians and vasectomy assistants to provide NSV. This course emphasizes the information needed to provide safe and effective NSV services and may require extensive practice time. It assumes that participants will bring skills, knowledge, and self-motivation to the training. In many areas, NSV services are provided as part of a team effort; thus, this course includes instructions for training vasectomy assistants.
EngenderHealth 2013	Instruments and supplies needed to provide clinical methods of family planning	RESPOND Project	Global			X	This is a checklist of the minimum number and types of medical instruments and supplies that EngenderHealth recommends as needed for provision of each of the four clinical methods of family planning (hormonal implants, IUDs, female sterilization, and vasectomy).
Family Health International 2008	Improving provision of vasectomy	Contraceptive and Reproductive Health Technologies Research and Utilization Program	Global			X	Provides specific recommendations for improving demand creation and user satisfaction.
Glasier 2010	Acceptability of contraception for	-	Global	X	X		Review that describes acceptability of male contraception in general,

	men: a review						including vasectomy, but is more focused on hormonal male contraception.
Jacobstein 2007	Vasectomy: the unfinished agenda	ACQUIRE Project	Global			X	An overview of supply, demand, and policy barriers to vasectomy uptake as well as a summary of recommendations generated based on previous vasectomy work.
John Snow Inc. 2010	Using quantification to support introduction and expansion of long-acting and permanent methods of contraception	RESPOND Project	Global			X	Guidelines and recommendations for "quantification" — forecasting and supply planning — to address the challenge of providing access to provider-dependent FP services.
Kols 2008	Vasectomy: Reaching out to new users	Information and Knowledge for Optimal Health Project	Global			X	A toolkit to inform FP/RH program managers about the benefits of vasectomy and considerations for vasectomy integration.
Lande 2008	Vasectomy: Tools for providers	Information and Knowledge for Optimal Health Project	Global			X	A toolkit for FP/RH counselors to inform vasectomy clients about the procedure and dispel potential myths/rumors.
Pile & Barone, 2009	Demographics of Vasectomy - USA and International	-	United States and Global	X	X		Review that describes trends and prevalence of vasectomy in all regions of the world and includes demographics of users.
Sub-Saharan Africa							
Adongo 2014	"If you do vasectomy and come back here weak, I will divorce you": a qualitative study of community perceptions about vasectomy in Southern Ghana		Ghana			X	Qualitative study with male and female community members, community health officers, community health volunteers, and district and regional health managers, which explores the social and cultural factors that affect vasectomy uptake in southern Ghana.
Akafuah 2008	Attitudes toward and use of knowledge about family planning among Ghanaian men		Ghana			X	Exploratory study to examine sociocultural factors related to knowledge, attitudes about, and practice of FP among a convenience sample of 200 men in Ghana.
Akpamu 2010	Knowledge and acceptance of 'vasectomy as a method of contraception' amongst literate married men in Ekpoma, Nigeria		Nigeria			X	Study that investigates the knowledge and acceptance of vasectomy as a male contraceptive method in Ekpoma, Edo State, Nigeria, among 350 literate, married men.
Alemayehu 2012	Factors associated with utilization of long acting and permanent contraceptive methods among married women of reproductive age in Mekelle town, Tigray region, north Ethiopia		Ethiopia			X	A cross-sectional community-based survey and qualitative component conducted with married men and women to assess factors associated with utilization of LAPMs.
Babalola 2013	Views on family planning and long-acting and permanent methods: insights from Malawi	RESPOND Project	Malawi			X	A project brief describing the RESPOND Project's results from and recommendations based on qualitative research conducted in Malawi among married and unmarried men and women, FP providers, and key

							informants to gain insights into the factors that may constrain the use of LAPMs.
Babalola 2012	Factors underlying the use of long-acting and permanent family planning methods in Nigeria: a qualitative study	RESPOND Project	Nigeria	X			A full report describing the RESPOND Project's results from and recommendations based on qualitative research conducted in Nigeria among married and unmarried men and women, FP providers, and key informants to gain insights into the factors that may constrain the use of LAPMs.
Babalola 2013	Views on family planning and long-acting and permanent methods: insights from Nigeria	RESPOND Project	Nigeria	X			A project brief describing the RESPOND Project's results from and recommendations based on qualitative research conducted in Nigeria among married and unmarried men and women, FP providers, and key informants to gain insights into the factors that may constrain the use of LAPMs.
Bunce 2007	Factors affecting vasectomy acceptability in Tanzania	ACQUIRE Project	Tanzania	X	X		Qualitative study among potential and actual vasectomy users and their wives describing factors affecting vasectomy acceptability in a region where ACQUIRE was working to focus on male RH services.
Cisek 2008	Revitalizing underutilized family planning methods: assessing the impact of an integrated supply-demand vasectomy initiative in Ghana	ACQUIRE Project	Ghana			X	Summary report of ACQUIRE's implementation of the SDA model to increase supply and demand of vasectomy in Ghana.
Davis 2009	Final feasibility evaluation for no-scalpel vasectomy in Rwanda	Capacity Project	Rwanda			X	Reports the activities and outcomes from training physicians and nurses in Rwanda on the use of NSV. The document also provides a service map/clinic flow diagram that could assist future clinics in their vasectomy integration plans.
Davis 2010	Successful no-scalpel vasectomy pilot program in Rwanda	Capacity Project	Rwanda		X	X	Technical brief provides details about user characteristics along with their motivations for getting a vasectomy and pilot training program outcomes.
de Vries 2009	Repositioning family planning: Rwanda's no-scalpel vasectomy program	Capacity project	Rwanda		X	X	Summary of the activities conducted as part of the Capacity Project to introduce vasectomy services in select Rwandan clinics. Includes motivations for getting vasectomy and satisfaction with services.
Ebeigbe 2011	Vasectomy: a survey of attitudes, counseling patterns and acceptance among Nigerian resident gynaecologists	-	Nigeria	X			A cross-sectional survey conducted with 104 resident OBGYN doctors in Nigeria conducted to determine the level of knowledge of, attitudes toward, counseling patterns regarding, and acceptance of vasectomy.
FHI 360 2011	Rwanda takes no-scalpel vasectomy nationwide	PROGRESS	Rwanda			X	Description of activities conducted to scale up vasectomy services — particularly the use of NSV with FI and thermal cautery — in Rwanda.
FHI 360 2013	No-scalpel vasectomy: scale-up. Approach in Rwanda shows promise	PROGRESS	Rwanda			X	A description of the monitoring efforts conducted by the Rwanda MOH and FHI 360 to understand institutional, structural, and individual factors influencing the choice of vasectomy in Rwanda and to improve quality and efficiency of the nationwide program.
Frajzyngier 2006	Factors affecting vasectomy acceptability in the Kigoma region	ACQUIRE Project	Tanzania	X	X		In-depth study with partners of and men who had and did not have vasectomies, key opinion leaders, and service statistics to explore the

	of Tanzania						variables that affect the decision-making process and to assess leaders' influence on vasectomy use and men's RH.
Kabenyi 2014	Barriers to male involvement in contraceptive uptake and reproductive health services: a qualitative study of men and women's perceptions in two rural districts in Uganda	-	Uganda	X			A qualitative study with men, women, and key informants (government and community leaders) to examine obstacles to men's support and uptake of modern contraceptives in Bugiri and Mpigi districts, Uganda.
Labrecque 2013	Strengthening vasectomy services in Rwanda: introduction of thermal cautery with fascial interposition	PROGRESS	Rwanda			X	Description of a provider training program on NSV with cautery combined with FI, along with associated costs of materials and length of training activities.
Nduka 2014	Perception of antenatal clinic attendees towards voluntary surgical contraception in a Nigerian Tertiary hospital	-	Nigeria	X			A study to explore knowledge and attitudes toward voluntary surgical contraception among 540 married and unmarried female antenatal clinic patients in Nigeria.
Ochieng, 2014	Determinants of readiness to undergo vasectomy, a family planning method for men in Busia County, Kenya	-	Kenya	X	X		A master's student's research project that analyzes socioeconomic and service-related factors associated with men's willingness to use vasectomy. Includes men who had and have not had vasectomies.
Odu 2006	Men's knowledge of and attitude with respect to family planning in a sub-urban Nigerian community	-	Nigeria	X			A descriptive, cross-sectional study to determine knowledge of and attitudes toward FP among 360 married and unmarried men in Ilorin, Nigeria.
Okunlola 2009	Awareness and practice of vasectomy among married male health workers at the University College Hospital, Ibadan, Nigeria	-	Nigeria	X			A descriptive, cross-sectional study to determine the awareness and practice of vasectomy among 250 male health workers at the University College Hospital, Ibadan.
Onasoga 2013	Knowledge and attitude of men towards vasectomy as a family planning method in Edo State, Nigeria	-	Nigeria	X			A descriptive study to assess the level of knowledge of vasectomy and determine the attitudes and factors influencing attitudes toward vasectomy among 136 men in Edo State, Nigeria.
Owusu-Asubonteng 2012	Trend, client profile and surgical features of vasectomy in Ghana	-	Ghana			X	Retrospective review of 271 vasectomies performed between January 2000 and December 2009 in three health care facilities to examine socio-demographic and reproductive characteristics of vasectomy users.
Rajani 2006	'Get a Permanent Smile' — increasing awareness of, access to, and utilization of vasectomy services in Ghana	ACQUIRE Project	Ghana			X	Description of the various activities conducted in the "Permanent Smiles" campaign in Ghana, as well as specific activities related to enhancing supply-side issues and demand-side concerns.
Shattuck 2014	Who chooses vasectomy in Rwanda? Survey data from couples who chose vasectomy, 2010-2012	-	Rwanda			X	This cross-sectional descriptive study describes vasectomy clients (n=316) and their wives (n=300) from 15 randomly selected hospitals in Rwanda.
Trollip 2009	Vasectomy under local anaesthesia	-	South Africa			X	This study evaluates the safety and efficacy of vasectomy performed under

	performed free of charge as a family planning service: complications and results						local anesthesia by junior physicians at a secondary level hospital as part of a free FP service.
Asia and the Middle East							
Azmat 2012	Barriers and perceptions regarding different contraceptives and family planning practices amongst men and women of reproductive age in rural Pakistan: a qualitative study		Pakistan	X			A qualitative study among men and women in rural Pakistan to understand the barriers to FP, knowledge of FP, perceptions regarding FP, quality of care, and free FP services.
Bathula 2013	Social stigma associated with vasectomy among females of Thullur Mandal in Guntur District		India	X			A cross-sectional study with 150 female postnatal patients in Andhra Pradesh, India, to explore the reasons why women opt for female sterilization rather than vasectomy.
Cui 2010	Factors influencing the declining trend of vasectomy in Sichuan, China	-	China	X	X		A qualitative study among FP providers and wives of and men who had and did not have vasectomies, to describe the reasons for the declining trend of vasectomy in a region of China.
Dilbaz 2007	Outcome of vasectomies performed at a Turkish metropolitan maternity hospital	-	Turkey			X	A study to determine prospectively the outcome of vasectomies performed by two trained surgeons over nine months. Includes user characteristics, complication rates, and follow-up rates.
Garg 2013	Nonscalpel vasectomy as family planning method: a battle yet to be conquered	-	India	X			A cross-sectional study among 428 married men with at least one child in North India to understand the barriers to using NSV related to knowledge, attitudes, and sources of information.
Garima 2013	Trends of utilization of family planning methods at district hospital of Madhya Pradesh: a retrospective study	-	India			X	This retrospective study analyzes the trends of utilization of different FP methods, including vasectomy, in relation to socio-demographic factors at a district hospital in the last five years.
Gunenc 2009	Opinions concerning male and female sterilisation in Turkey	-	Turkey	X			A descriptive cross-sectional study to determine the attitudes of women and men regarding male and female sterilization among 1,211 women of reproductive age and their husbands (n=1174).
Hall 2008	Social and logistical barriers to the use of reversible contraception among women in a rural Indian village	-	India	X			A qualitative study to understand women's preference for female sterilization and attitudes toward vasectomy and reversible contraception among women in western India.
Jabeen 2006	Psychosocial factors and male sterilization	-	Pakistan			X	A study looking at the demographic profile of vasectomy clients and the psychosocial factors motivating them to use vasectomy.
Keramat 2011	Barriers and facilitators affecting vasectomy acceptability (a multi stages study in a sample from north eastern of Iran), 2005-2007	-	Iran	X	X		A study that describes factors associated with acceptability of vasectomy among partners of and men who had and did not have vasectomies.
Kumar 2007	Men's perspective on non-scalpel vasectomy in rural Kerala	-	India	X			A cross-sectional study that assesses the knowledge, attitudes, and behavior related to NSV among 661 married men with at least one child in Kerala, India.

Labrecque 2005	Vasectomy surgical techniques in South and South East Asia	ACQUIRE Project	Cambodia, Thailand, India, Nepal, and Bangladesh			X	This study summarizes the surgical vasectomy techniques currently used in five Asian countries and evaluates the facilitating and limiting factors to introduction and assessment of FI and thermal cautery in these countries.
Mahapatra 2014	Assessment of knowledge and perception regarding male sterilization (non-scalpel vasectomy) among community health workers in Jharkhand, India	-	India	X			A cross-sectional study that assesses the knowledge and perception of 200 CHWs regarding vasectomy in the Simdega district of Jharkhand, India.
Mehra 2013	Orientations: a capacity building tool for improving knowledge and perception of health workers regarding non scalpel vasectomy	-	India	X		X	This study assesses the knowledge of CHWs regarding NSV and the effect of orientation in improving their knowledge.
Nagarajappa 2005	A study on knowledge of married men on no-scalpel vasectomy	-	India	X			A cross-section study to assess knowledge of NSV and compare knowledge with demographic variables among 200 married men with at least one child in Bangalore, India.
Nishtar 2013	Myths and fallacies about male contraceptive methods: a qualitative study amongst married youth in slums of Karachi, Pakistan	-	Pakistan	X			A qualitative study to explore perceptions regarding myths and fallacies related to male contraception among married young men and women (18-24 years) in Pakistan.
Padmadas 2014	Do mobile family planning clinics facilitate vasectomy use in Nepal?	-	Nepal			X	Assessment of the impact of mobile clinics in improving access and uptake of vasectomy services in remote areas.
Sahin 2008	Male university students' views, attitudes and behaviors towards family planning and emergency contraception in Turkey	-	Turkey	X			A descriptive study with 278 male university students to determine their views, attitudes and behavior towards FP and emergency contraception in Turkey.
Sahin 2008	Male participation in contraception in an eastern province of Turkey	-	Turkey	X			A descriptive study to determine 801 men's knowledge, attitudes, and practice toward FP in a northeastern province of Turkey.
Scott 2011	Factors affecting acceptance of vasectomy in Uttar Pradesh: insights from community-based, participatory qualitative research	-	India	X			A participatory ethnographic evaluation research study with men and women to understand the reasons for the low prevalence of vasectomy in Uttar Pradesh, India, and to contribute to developing an approach for increasing demand.
Simbar 2012	Achievements of the Iranian family planning programmes 1956-2006	-	Iran			X	A review of the FP programs in Iran and their achievements during the latter half of the 20 th century. This paper proposes potential successful strategies for health promotion and behavior change.
Singh 2014	Increasing male participation in the uptake of vasectomy services	RESPOND Project	India			X	Summary of interventions conducted as part of the RESPOND Project in India to address misperceptions about the vasectomy procedure among men and women and to ensure quality of services provided.
Stover 2007	Long-term and permanent methods of family planning in	Global Health Technical	Bangladesh			X	Reviews the status of and potential for strengthening support for LAPMs throughout the public, nongovernmental, and private sectors of

	Bangladesh	Assistance Project (GH Tech)/ACQUIRE					Bangladesh.
Taylor 2008	Revitalizing underutilized family planning methods: using communications and community engagement to stimulate demand for vasectomy in Bangladesh	ACQUIRE Project	Bangladesh			X	An overview of the SDA Program Model for FP/RH Service Delivery to coordinate and synchronize these mutually reinforcing components affecting the acceptance of FP services.
The RESPOND Project 2014	End-of-project evaluation of the RESPOND No-Scalpel Vasectomy Initiative in Uttar Pradesh and Jharkhand States, India	RESPOND Project	India			X	Reports the results from technical assistance offered through the RESPOND Project in Uttar Pradesh and Jharkhand, India, according to the SEED Programming Model.
Tuladhar 2008	Awareness and practice of family planning methods in women attending Gyne OPD at Nepal Medical College Teaching Hospital	-	Nepal		X		A cross-sectional descriptive study of awareness and practice of FP methods among 200 female gynecology patients in Nepal.
Valsangkar 2012	Predictors of no-scalpel vasectomy acceptance in Karimnagar District, Andhra Pradesh	-	India			X	A community-based, case-control study (men who had and did not have vasectomies) conducted to elucidate the reasons for higher acceptance of NSV in Karimnagar District compared to state and national rates.
Yahner 2012	Using an employer-based approach to increase support for and provision of long-acting and permanent methods of contraception: the India experience	RESPOND Project	India			X	Reports the activities and outcomes of an employer-based FP/RH promotion intervention in India.
Yinger 2013	Views on family planning and long-acting and permanent methods: insights from Cambodia	RESPOND Project	Cambodia		X		A project brief describing the RESPOND Project's results from and recommendations based on qualitative research conducted in Cambodia among married and unmarried men and women, FP providers, and key informants to gain insights into the factors that may constrain the use of LAPMs.
Latin America and the Caribbean							
de Rodriguez 2005	Expanding access to vasectomy services in the Ministry of Health of Guatemala	FRONTIERS Project	Guatemala			X	Reports the activities conducted as part of the FRONTIERS Project in Guatemala to introduce NSV services in selected clinics.
Manhoso 2005	Men's experiences of vasectomy in the Brazilian Public Health Service	-	Brazil			X	Qualitative study that describes the experiences of a group of 20 men who had had vasectomies, including motivations to get a vasectomy and satisfaction with services.
Marchi 2008	Contraceptive methods with male participation: a perspective of Brazilian couples	-	Brazil		X		A qualitative study with 20 couples who had requested vasectomy to assess perspectives on male participation in FP and contraceptive methods available to men in Campina, Brazil.
Marchi 2010	Vasectomy within the public health	-	Brazil			X	Descriptive study that describes characteristics of 202 men who had a

	services in Campinas, Sao Paulo, Brazil						vasectomy in the public health network between 1998 and 2004.
Taylor 2008	Revitalizing underutilized family planning methods: using communications and community engagement to stimulate demand for vasectomy in Honduras	ACQUIRE Project	Honduras			X	Summary of demand-side interventions initiated in late 2004 aimed to reposition vasectomy as a simple and effective male method of FP in Honduras.
The FRONTIERS Project 2007	On-site training and outreach for introducing vasectomy services	FRONTIERS Project	Guatemala			X	Summarizes the results of the FRONTIERS Project in Guatemala to introduce NSV services in selected clinics.
Vernon 2007	Introducing sustainable vasectomy services in Guatemala	FRONTIERS Project	Guatemala			X	This document describes the efforts of the FRONTIERS Project in Guatemala to develop, test, and evaluate a model for the introduction of sustainable NSV services in MOH hospitals.
Multiple countries from different regions							
Wickstrom 2013	Approaches to mobile outreach services for family planning: a descriptive inquiry in Malawi, Nepal, and Tanzania	RESPOND Project	Malawi, Nepal, Tanzania			X	Documents the role of mobile outreach to fulfill FP/RH client needs in Malawi, Nepal, and Tanzania.
Seamans 2007	Modelling cost-effectiveness of different vasectomy methods in India, Kenya, and Mexico	HealthTech IV	India, Kenya and Mexico			X	Compares the cost-effectiveness of different vas occlusion methods.