

# **The Persistence of Outmoded Contraceptive Regimes: The Cases of Mexico and Brazil**

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IN THE LAST several years, spurred in large part by Susan Watkins's persuasive argumentation and the rigorous analytic formulations of John Casterline, Mark Montgomery, and Luis Rosero-Bixby, there has been a resurgence of interest in the roles of social networks and interpersonal communication in fertility transitions and in the spread and changing composition of contraceptive practice.<sup>1</sup> By and large, these authors have concentrated on the exchange of information and ideas among prospective parents or contraceptive users, and they have focused on the beginning and middle parts of the process rather than its later stages. Moreover, they have generally viewed networks and the transmission of information across them as positive phenomena that should be taken advantage of in the design of public policies. In this article, I argue that there is ample reason to explore the problems as well as the opportunities that networks and diffusion pose and to consider the role of the providers of contraceptive services both as brokers of information between users and as agents who control or at least influence the choice of reproductive and contraceptive technologies. In so doing, I look at the later as well as the earlier stages of the fertility transition and point to some of the contradictions and dilemmas that these matters pose for emerging norms regarding reproductive health and quality of care.

What might be the problematic aspects and consequences of social interaction? While there is no doubt that the interpersonal exchange of information across networks can speed the fertility transition, it is also responsible for the inertia that makes introduction of new contraceptive technologies difficult. Less recognized is the inertia that may be encountered in the later stages of the fertility transition wherein individuals and institutions may become committed to a reduced set of contraceptive practices that may be

far from optimal for most if not all women. I argue that the tendency to become accustomed to a reduced range of methods and particular ways of practicing them results from the various sorts of positive reinforcement that contraceptive choices are subject to, and follows the logic of path dependence.

I illustrate the ways in which contraceptive regimes that evolved in one set of circumstances can persist long after they no longer make sense with experiences drawn from Mexico and Brazil, countries that have experienced substantial declines in fertility, but that have had widely different experiences in the realm of population policy. Mexico illustrates how government policies and styles of implementing them may outlive the conditions for which they were originally designed, while Brazil shows how a far more laissez-faire approach can also yield perverse, unwanted outcomes.

### The stylized facts

Writing in this journal, Bongaarts and Watkins (1996) have provided a comprehensive review of the empirical evidence regarding the timing and pace of contemporary fertility transitions. As did demographers familiar with the history of the demographic transition in the West, they show that contemporary transition characteristics do not follow directly from either levels or rates of change of "conventional measures of development," and that "once a country has begun a transition, further declines follow almost invariably." Using countries as the units of analysis, they find large differences in levels of fertility and socioeconomic conditions prevailing at the onset of the transition, and little or no correspondence between the pace of the ensuing change in fertility and change in socioeconomic conditions (at least as reflected in the human development index, or HDI). They do, however, determine that the onset of fertility decline within countries in a macro-region can be predicted quite well on the basis of the level of development and the time elapsed since the first country in the region entered the fertility transition. Having established these features of contemporary fertility transitions, they proceed to suggest that much of the unexplained variation in contemporary fertility transitions, as well as in earlier ones, can be accounted for by the transmission of information and ideas regarding fertility and its control, and that "social interaction . . . accelerates the pace of transition" (p. 669).<sup>2</sup>

The argument that I make in this article is not that these facts and inferences are incorrect. Rather than question the importance of a diffusion process at work, my goal is to broaden the discussion of its consequences to include the problems that may be associated with the choice and practice of methods of birth control. To lay the basis for my suggestions as to how the scope of thinking about social interactions should be expanded, I draw at-

tention to the “stylized facts” pertaining to the contraceptive use associated with contemporary fertility transitions.

### Wide variations in method mix

Perhaps the most striking aspect of contemporary contraceptive practice is the wide variation that exists across populations. The magnitude of this variation can be seen in Table 1, which shows contraceptive use by method for 26 countries selected from among those for which the United Nations (1996) has compiled this information. The percentages highlighted in bold print are for the most prevalent methods practiced in the country. While the cases have been selected to emphasize the diversity in world experience, the picture presented in the table is nonetheless striking. In many of the countries, the bulk of contraceptive use is concentrated on one or two methods rather than being spread over a larger number. Second, the most prevalent methods are not the same across these countries. For example, while female sterilization is an important method in about half of the countries shown in Table 1, its prevalence is below 5 percent in seven of the countries, all of which have a relatively large percentage of married women practicing contraception. Male sterilization is less frequently practiced than female sterilization among these countries, but is an important method in Nepal, Korea, and the United States. Other methods also show a wide range in prevalence: use of the pill ranges from less than one percent in Vietnam and Japan to 46 percent in Belgium, injectables from 15 percent in Indonesia to less than 2 percent in 16 countries, the condom from 48 percent in Japan to 3 percent or less in 17 countries, vaginal barrier methods are used by more than 2 percent of married women only in the United States, rhythm is practiced by 21 percent of married women in Peru and is an important method in Japan and Sri Lanka, and, finally, withdrawal is the most widely practiced method in Turkey, the Czech Republic, and Romania.

Each of these societies has a particular history, culture, medical system, and set of relations with other societies, and explanations for the individual patterns can be sought in those particularities.<sup>3</sup> In an era of globalization in which goods and ideas are thought to travel more freely than ever before, however, such variation in the methods of contraception used in different countries has to command our attention. Simple appeals to variations in the preferences of individuals and couples—perhaps reflecting patriarchy or prevailing sexual practices—do not seem convincing, nor do explanations based solely on programmatic fiat or market restrictions. Also, there is no correlation between average levels of income or education and the prevalence of certain methods. Indeed, the most striking aspect of these data is how little use is made in so many places of the contraceptive technology that is available today.

TABLE 1 Percent of married women of reproductive age using contraception, by method, 1980s and early 1990s, selected countries

Country and year	Female sterilization	Male sterilization	Pill	Injectable	IUD	Condom	Vaginal barrier	Rhythm	With-drawal	Any method
Egypt 1992	1.1	0.0	12.9	0.5	27.9	2.0	0.4	0.7	0.7	46.2
Kenya 1993	5.5	0.0	9.5	7.2	4.2	0.8	0.1	4.4	0.4	32.7
Bangladesh 1993	8.2	1.1	17.7	4.5	2.1	3.0	0.0	4.9	2.5	45.1
Hong Kong 1987	22.9	0.9	16.4	2.5	4.5	26.0	1.8	5.4	0.5	80.8
Indonesia 1991	2.7	0.6	14.8	14.8	13.3	0.8	0.0	1.1	0.7	49.7
Jordan 1990	5.6	0.0	4.6	0.0	15.3	0.8	0.6	3.9	4.0	35.0
Nepal 1991	11.0	6.8	1.0	2.3	0.2	0.6	0.0	0.5	0.4	22.7
Philippines 1993	11.9	0.4	8.5	0.1	3.0	1.0	0.0	7.3	7.4	40.0
Korea 1991	35.3	12.0	3.0	0.1	9.0	10.2	0.1	7.0	2.7	79.4
Sri Lanka 1987	24.8	4.9	4.1	2.7	2.1	1.9	0.0	15.0	3.4	62.0
Thailand 1987	22.4	5.5	20.0	9.2	7.2	1.2	0.0	1.0	0.9	67.5
Turkey 1993	2.9	0.0	4.9	0.1	18.8	6.6	1.2	1.0	26.2	62.6
Vietnam 1988	2.5	0.3	0.4	0.0	31.0	1.1	1.7	7.5	6.6	53.2
Colombia 1990	20.9	0.5	14.1	2.2	12.4	2.9	1.2	6.1	4.8	66.1
Dominican Rep. 1991	38.5	0.2	9.8	0.2	1.8	1.2	0.1	2.0	2.2	56.4
El Salvador 1993	31.5	0.4	8.7	3.6	2.1	2.1	0.0	3.0	2.0	53.3
Brazil 1986	26.9	0.8	25.2	0.6	1.0	1.7	0.5	4.3	5.0	65.8
Mexico 1987	18.7	0.8	9.8	2.8	10.2	1.9	0.6	4.4	3.5	52.7
Panama 1984	32.4	0.4	11.8	0.8	6.0	1.6	1.2	2.3	1.4	58.2
Peru 1991	7.9	0.1	5.7	1.9	13.4	2.8	1.0	20.7	3.9	59.0
Japan 1992	3.2	0.8	0.8		3.1	48.0	0.8	10.6	4.9	64.0
United States 1988	23.4	12.9	15.1		1.5	10.6	5.6	2.1		74.3
Belgium 1991	11.4	7.6	46.4		5.0	4.8	0.0	2.1	2.0	79.4
France 1988	6.7	0.0	29.7		25.9	4.3		6.4	6.6	81.2
Czech Rep. 1993	2.7	0.0	8.0	0.0	15.3	18.8	0.2	1.9	22.1	68.9
Romania 1993	1.4	0.0	3.1	0.0	4.2	3.9	1.9	8.5	34.4	57.3

NOTES: Blanks in the table correspond to methods for which prevalence estimates are not available and use is known to be either negligible or very small. The figures shown in the method columns do not always sum to the "Any method" percentage because of the use of methods that have been classified as "other methods" or "not stated," as well as resort to prolonged abstinence, none of which are shown.

SOURCE: United Nations (1996: Table A.6). The highlighted methods are either the most prevalent method, a method for which the prevalence is at least 60 percent of that of the most prevalent method, or a method with a prevalence greater than 10 percent.

### **The persistence of collective and individual contraceptive choices**

When viewed in a longer-term, dynamic perspective, the evolution in patterns of contraceptive use is perhaps even more anomalous than the cross-section shown in Table 1. While there is often an understandable trend away from the use of traditional methods and toward the use of modern, more medicalized methods, what is surprising is the persistence of a particular mix and the tendency for the distribution of use to become more concentrated through time. In Mexico, as will be seen below, a tendency toward increased prevalence of the IUD and sterilization in recent years has come at the expense of the use of the pill and injectable contraceptives. The use of the IUD has diminished sharply in some countries such as the United States. In many countries such as Brazil, the tendency is toward reliance on just two methods, the pill and sterilization, with sterilization occupying an increasingly large share over time. There is no widely accepted explanation as to why the method mix does not become more diverse as more methods become available, or why the methods used in one country frequently do not become popular in neighboring countries.

The tendency toward a persistent, narrow distribution of use by method at the aggregate level has a parallel at the level of the individual. The relatively small number of studies that have looked at sequences of use among individuals display high stability in a woman's choice of methods. That is to say, there is relatively little switching. This conclusion was drawn early on with respect to the United States by Ryder and Westoff (1971) and by Michael and Willis (1975), both using data from the 1965 National Fertility Survey (NSF). When the latter authors examined successive segments of use, they found that about three-quarters of the couples who were using either the diaphragm, condom, or withdrawal in the first segment were using the same method in the following segment. Survey data have also provided strong evidence of stability among women in Malaysia (DaVanzo, Ann, and Othman 1986; Reboussin et al. 1987). Reboussin et al. noted that "couples used the same method of contraception both before and after 84 percent of the pregnancies in our sample" (p. vi). They concluded that the trend toward the use of modern methods of contraception apparent in the aggregate method mix was not the result of individual women substituting modern for traditional methods. Rather, those women who were using traditional methods continued to do so, while new cohorts of previous nonusers began practicing modern methods.

Further evidence of the tendency of women to continue using a method that they have already chosen is provided in studies of who accepts new methods of contraception when they are introduced. Michael and Willis used the 1965 NSF to study adoption of the pill when it was first introduced, and found that, as in Malaysia five to ten years later, women who

had not used a method were more likely to adopt the pill than women who had previously used another method. Results concerning the likelihood of adopting the subdermal contraceptive implant when it was first introduced are also available for Malaysia and the United States (Molyneaux 1997; Mellor 1997). Here again, previous nonusers were more likely to adopt the new method than were women who had previously used another method.

## How and why contraceptives are chosen

The standard conceptual formulations regarding contraceptive choice are closely related to familiar models of consumer choice theory wherein an individual takes into account the various attributes of a method such as its cost, including the time involved in acquiring the method, its ease of use, effectiveness, reversibility (in the case of sterilization), and possible side effects (Bulatao 1989). People start with a utility function, or set of preferences; they are subject to constraints with respect to their time and income; they encounter a specific set of prices (in terms of both money and time) for different methods; and they eventually select the method that is best for them (maximizes their utility). Perhaps the most familiar type of logic related to the application of this model of contraceptive choice is that “spacers” will give less weight than “limiters” to the effectiveness of a method. The model leads, in the absence of complications, to a felicitous outcome: individuals and groups of individuals choose the methods that are best for them.

The model has been extended in an attempt to account for the low frequency of method switching. Michael and Willis (1975) and Mellor (1997) have suggested substantial “fixed costs” attached to contraceptive practice as an explanation for the large fraction of couples who continue to use the same contraceptive method over time, and the large percentage of the adopters of new methods constituted by individuals who were not previously using a method. The fixed costs that inhibit people from switching methods are not well investigated, but are supposed to include monetary, psychic, information, and health costs. Monetary costs might include expenditures for consultations with physicians, as well as the expense of the method. Information costs refer to all efforts to gather information at the time of method selection, and fixed health costs are those incurred by using a method only once. Others have suggested directions in which to expand the dynamic aspects of the model (Mundigo, Phillips, and Chamratrithirong 1989) so as to incorporate the learning that occurs as couples gain experience with individual methods.

Most recently, as noted at the outset, attention has been focused on social learning: individuals are seen as depending on others for information about the existence of new technologies and about the risks and conse-

quences of adopting them (Montgomery and Casterline 1996; Kohler 1997a and 1997b). In the remainder of this section, I first highlight two aspects that have not been given their due emphasis in most discussions of diffusion and social learning with respect to contraception, and then discuss the properties of a model of contraceptive decisionmaking that incorporates these extensions and considerations.

### Fear of health consequences

The uppermost concern that women and sometimes couples have regarding modern medical contraceptive methods is that they will be damaging to their health. Modern medical methods include hormonal contraception, the IUD, and surgical sterilization—the contraceptives that have accounted for the bulk of contraceptive use in contemporary fertility transitions. The concern involved may range from well-informed, scientifically based fear of contracting pelvic inflammatory disease from using an IUD to a general worry that use of any of these methods will prove to be life-threatening based on a cognitive model of the body at some distance from the Western model and based on rumors afloat in the community.<sup>4</sup>

One of the most compelling descriptions of the role that fear plays in contraceptive decisionmaking is found in an article by Shedlin and Hollerbach (1981).<sup>5</sup> Their subjects were women living in a rural community outside the city of Toluca, Mexico who had an understanding of reproductive processes based on “traditional,” non-Western conceptions, and ample experience with the consequences of using traditional means of avoiding or ending pregnancies. The dilemma facing women seeking to limit their fertility is to choose the least dangerous of the available options. The traditional methods present threats that are well known, while new methods such as the pill seem frightening both because they seem designed to interfere with the body’s natural functions and because stories circulate in the community about side effects. There are conflicting authorities regarding medical matters. Traditional practitioners and midwives seldom endorse the new methods but continue to provide the old ones, while the young and often ill-prepared interns in the nearby government health post often fail to present a convincing case for the methods they offer.

Shedlin and Hollerbach’s account is based on extensive anthropological fieldwork by one of the investigators. It is reflective of a large literature on the conflict between modern and traditional medical systems and the resistance to modern contraceptives in communities in which the modern medical paradigm is not dominant. But fear of contraceptive methods is not restricted to traditional populations; it is also found in the most highly medicalized of societies. The perennial concern for the health consequences of the pill in the United States and Britain, the backlash against the IUD



that resulted from the legal proceedings of the late 1980s in the United States, and the recent wave of Norplant® removals in the United States are, in all likelihood, reflections of this underlying phenomenon. Work in cognitive psychology points to fear of severe or life-threatening outcomes, even when such outcomes are statistically remote, and suggests that it is human nature to attribute great importance to such outcomes in forming impressions and making choices. Montgomery (1996) has surveyed this literature with a view toward understanding the problem that individuals and populations may have in perceiving the mortality changes that are occurring in their communities. Citing the review by Camerer (1995), Montgomery concluded that individuals tend to employ relatively simple learning strategies, and that they “consistently make fundamental mistakes in probabilistic reasoning, tending to assign too much weight to certain types of evidence and not enough to others” (p. 15).

The “mistakes” people are apt to make are of the very sort that would lead them to assign “too much weight” to severe or life-threatening outcomes resulting from the use of technologies such as contraception. There are several ways in which this may come about. First, individuals may give less weight to events that do not occur than to events that are noteworthy, because they have a differential proclivity to retain the information. In this instance, the notion is that people have a greater capacity to retain information about someone who develops a serious illness while using a contraceptive method than about someone who has used a method uneventfully. Second, individuals tend to give more weight to a small sample of evidence with which they are directly familiar than to a statistical portrait of the experience of the larger population. Third, “people are highly sensitive to variations in the extremeness of evidence and not sufficiently sensitive to variations in its credence or predictive validity . . . ” (Griffin and Tversky 1992: 413, quoted by Montgomery 1996: 19–20). Moreover, they are likely to pay more attention to negative events and information than to positive information and to be especially attuned to the occurrence of events that are both highly undesirable and not easily prevented or controlled.

If the psychological literature reviewed by Montgomery suggests that people are especially sensitive to information about highly deleterious or possibly lethal consequences of using contraceptives, it also suggests that they will pay special attention to events that befall members of their immediate families and communities, and thus provides support for the idea that social interactions are vital to decisions regarding contraceptive use. Indeed, in the light of this literature, the quintessential social interaction related to contraception is rumors circulating through a community about someone who suffered a serious illness as the result of having used a method. A last finding from the psychological literature that adds further importance to such rumors and echoes Shedlin and Hollerbach’s emphasis on cognitive



models of human reproduction refers to “the importance of pre-existing beliefs and theories about causation, which function as mental frameworks through which new evidence is interpreted” (Montgomery 1996: 24). Thus, if a woman’s mental model of the menstrual cycle and the uterus is such that she believes inserting an IUD would have severe consequences, then it will take a great deal of personally verified information to the contrary for this person to be willing to accept this method.<sup>6</sup>

### The role of medical practitioners

At least in part because of the importance of the fear of health consequences, doctors trained in Western medicine have played an important part in shaping patterns of contraceptive practice. Often they either constitute or control the sources of new contraceptive methods, and they are the authority that must attest to their safety and efficacy. They may prescribe, recommend, or offer a contraceptive method or surgical sterilization to their patients.<sup>7</sup> This prescription or recommendation may specify the exact brand or dosage, as well as the timing and manner of its use or execution. In so doing, the medical practitioner or his or her superiors may be singling out one technology, such as a specific kind of IUD or manner of performing a sterilization, from an array of possible choices. These choices are not normally left to individual patients.

Once a method has been prescribed or recommended, the medical practitioner explains how the method works, how it should be used, and what side effects to expect. He or she may also provide information and assurance as to the safety and effectiveness of the method. The final role of the doctor or medical practitioner is to monitor use of the method by the acceptor. The doctor may have to check that there are no complications from use such as pelvic inflammatory disease in the case of an IUD, to provide explanations and assurances regarding the “normality” of certain relatively benign side effects such as increased menstrual bleeding, and to propose the use of an alternative method should the acceptor be dissatisfied or suffer serious complications of use.

In these functions and exchanges between a physician and a patient, there is a widely recognized difference between the two parties. As Kenneth Arrow wrote nearly four decades ago with regard to medical care more generally: “Because medical knowledge is so complicated, the information possessed by the physician as to the consequences and possibilities of treatment is necessarily very much greater than that of the patient, or at least so it is believed by both parties” (1963: 951). It is this asymmetry in knowledge that makes “the setting up of a relationship of trust and confidence” so important to both patients and doctors (1963: 965). In the realm of contraceptive counseling, patients’ fears of contraceptive methods and sometimes

wavering motivation to use them provide ample scope for a doctor to play a large role in guiding individuals through the process of adopting and practicing a method.<sup>8</sup>

The second general feature of medical care and the role of physicians that is relevant to contraceptive adoption also stems from the complexity of medical knowledge and technology and the uncertainty that surrounds them. In making recommendations concerning contraceptives, doctors face a wide range of choice. Moreover, with regard to the safety and efficacy of different contraceptives, the professional literature is too large to master,<sup>9</sup> and it would be difficult for a single practitioner to accumulate enough patients accepting a new contraceptive method to be able draw his or her own inferences about how well it works. Here, as in many other areas of medicine, "The inference problem confronting doctors who wish to determine the efficacy of any specific intervention is hellishly complex . . ." (Phelps 1992: 34).

Phelps has argued that an important consequence of this contextual feature of medical practice is that doctors tend to conform closely to "local patterns of practice." On the one hand, "In this model, when 'schools of thought' get established in a specific locality, the costs of gathering relevant evidence to alter those beliefs will often be large, if not prohibitive. Thus, local 'schools' can emerge and persist that hold different beliefs about the efficacy of an intervention" (1992: 31). On the other hand, conforming to local patterns is an excellent defense against charges of negligence, a standard commonly applied in malpractice law. What is surprising, though, is the enormous variation across communities and countries in the frequency with which a wide variety of medical procedures are performed. Such variation cannot be explained by plausible differences in demand, and authors such as Scitovsky (1992) and Phelps (1992) can only account for it in terms of incomplete diffusion of information. Seen in this larger context, the wide variation in contraceptive use patterns shown in Table 1 seems less anomalous.

### **Social interactions, positive feedback, and path dependence in models of contraceptive adoption**

I now consider the nature, extent, and consequences of the various positive feedback loops that are present in the broad process of contraceptive adoption. If multiple and forceful sources of positive reinforcement are operating in this process, then it becomes easier to understand why societies have arrived at such widely varying method mixes.

The recent economic literature on increasing returns and path dependence suggests at least four possible sources of positive feedback in adopting new and competing contraceptive technologies (Arthur 1983, 1989, 1993; Bikhchandani, Hirschleifer, and Welch 1998; David 1985, 1993; Dosi 1991). First, spillover effects known as *coordination externalities* provide in-

centives for agents to adopt the dominant technology and do whatever other agents are doing. If, say, the pill is the dominant method, a prospective user can count on a large number of outlets that stock adequate supplies, as well as availability of trained professionals able to recognize and treat the method's side effects. The same reasoning holds for doctors. As more and more of their colleagues prescribe or provide a method, they can draw on the experience that these doctors have in supervising the use of the method or performing the requisite procedure.

A second source of positive reinforcement derives from *learning*. The more experience is gained with a contraceptive technology, the more it is improved. That is, the technology itself changes for the better the more it is used.<sup>10</sup> Learning is perhaps most obvious with respect to providers. For example, the more practice providers gain inserting IUDs, the more skillful they become with the procedure; the more experience they have prescribing pills, the more they learn about varying the dosage to relieve specific side effects. But there is also learning by producers and users of contraceptive methods that leads to improvement of the technology. Examples are found in the evolution of formulations for the pill from high to very low doses of estrogen, and in the improvements in the design of IUDs.

The third source of positive reinforcement arises not from any concrete aspect of the technology itself but from *information* about its use. This is the positive feedback that lies at the heart of most accounts of diffusion and social interaction; it has particular relevance to technologies that are perceived to be risky.<sup>11</sup> The information in question is not simply about the existence of a technology but also about the risks and consequences of adopting it (Montgomery and Casterline 1996). The need for information concerning the practicality, safety, and effectiveness of new contraceptive technologies is felt not only by prospective acceptors but also by the medical practitioners who provide these technologies (Phelps 1992). From either perspective, however, the more widely a method is used, the more will be known about how it fares in practice. Other things equal, risk-averse persons may be expected to opt for a technology that their peers have used successfully. On the other hand, as more women adopt a new method, the number of individuals who experienced or are perceived to have experienced an undesirable health outcome from using the method may also increase, leading to rumors that may have a strong adverse effect on a method's acceptability.<sup>12</sup>

*Social influence* is one further source of increasing returns. Montgomery and Casterline (1996) suggest that, through peer group pressure, women may feel obliged to do what everybody else in their social network does. Incentives to conform may be even stronger for medical practitioners than they are for women. As noted above, according to Phelps, "local patterns of practice" are often the standard against which the actions taken by an indi-

vidual physician are compared in the event that he or she is being evaluated or that an inquiry is held to determine negligence (1992: 35).

To summarize, the process of adopting new contraceptive technologies involves four distinct but complementary sources of increasing returns: coordination externalities, learning, information, and social influence. Moreover, each of these operates with respect to the providers as well as the users of contraceptive methods. What can be said about a process of technology adoption that contains such sources of positive feedback? A general answer is available from the literature on increasing returns, path dependence, and information cascades. In theoretical models and simulations, "the economy, under circumstances of increasing returns, can become 'locked-in' to a future technological path that is neither guaranteed to be efficient nor entirely predictable in advance" (Arthur 1983: 14). In these models, which are said to be path-dependent and non-ergodic (David 1985), relatively small disturbances or chance events become magnified by the positive feedbacks, and there is no sure way to predict the technology that will come to dominate the market. Rather, history matters, sometimes more than underlying preferences, endowments, and opportunity sets.

### **The transformation of the meaning and nature of a technology**

There is a striking similarity between the issues raised in Arthur's and David's discussions of the implications of positive feedbacks and those that anthropologists have brought up in their critique of diffusion. Kreager (1993), in his succinct review of the debates on this subject that have occurred since the 1890s, warns that in their enthusiasm for the concept of diffusion in population studies, contemporary analysts would do well to avoid past mistakes. Drawing on Dosi's review of a number of studies of innovation diffusion (1991), Kreager argues that there is more to the adoption of new technologies than individual choices based on instrumental factors. He observes that "decisions are the outcomes of collective processes"; and that, in the course of adoption, "technologies and practices acquire a range of new and culturally-specific meanings" (1993: 315). He quotes Malinowski's statement that "whenever one culture 'borrows' from another, it always transforms and readapts the objects or customs borrowed. . . . In this process of readaptation the form and function, often the very nature, of the object or idea is deeply modified—it has to be, in short, reinvented" (1993: 315).

The conclusion in this discussion is similar to that drawn from the analysis of increasing returns: the adoption process is both cumulative and open-ended. The anthropological critique, however, introduces the additional dimension of *meaning*, with the attendant anthropological discourse concerning culture as the "tacit knowledge that enables people to make active responses

to changing circumstances as they arise, successively reinterpreting the meaning of those circumstances and the several courses of behaviour that count as a response to them" (Kreager 1993: 319; Hammel 1990). The implication for contraceptive choice may be clarified by way of an example. The condom is now being promoted around the world as a means of accomplishing two distinct objectives: the prevention of pregnancy and the prevention of sexually transmitted diseases. Forty years ago in South American countries such as Argentina condoms were generally available in the bathrooms of bars to men who might be considering having sex with a prostitute. Condoms were seen as a response to the health risks entailed in such encounters. They were not seen, or considered acceptable, as a means to prevent pregnancy within marriage. Argentinean couples in the 1950s, like those in much of Europe a few decades earlier, attained quite low levels of marital fertility while relying on withdrawal rather than the condom. A different outcome evolved at about the same time in Japan, where the condom came to be the principal means of preventing pregnancy within marriage (Coleman 1981).

### The question of scale

Where does this discussion of the literature on contraceptive choice, cognitive psychology, and path dependence lead us? The process of adopting new contraceptive technologies involves a variety of positive feedback loops for both clients and their doctors. This reinforcement means that what happened some time ago has a determinant bearing on what takes place in the present, even when there has been a major change in the environment. There may also be specificity in the way that methods are actually practiced due to adaptations that have been made over time of particular contraceptive technologies, and the meanings that they have acquired.

The scale of the community within which these choices and adaptations are made, however, will depend on communication between agents. Bongaarts and Watkins (1996) stressed that social interactions related to fertility change occur at a variety of levels, not only within localities but also across large territories, including national boundaries. On the other hand, much of the impetus and underpinning for theorizing about the role of networks in contraceptive choice has been the persistence of otherwise unexplainable differences in method mix across communities (Rogers and Kincaid 1981; Entwistle et al. 1996). Indeed, the first attempt to explicitly model contraceptive adoption as depending on word-of-mouth communication across networks focused on replicating the persistence of "village-level" variation in method mix (Kohler 1997a, 1997b). In this study, Kohler showed that, under a series of possible conditions concerning the precision of the information exchanged, decision rules, and the role of social influence,

word-of-mouth communication leads to path-dependent adoption of contraceptive methods within communities. Here, the method mix that a community becomes committed to is heavily influenced by the initial conditions and “does not converge to the socially optimal adoption level” (pp. 91–92).

Broadening the conceptualization of adoption to include the choices made by doctors as well as users, and considering interactions beyond those based on word-of-mouth communication, lead to the expectation that the respective networks range well beyond villages or local communities. While broader ties may help to explain the speed and reach of the contraceptive adoption process observed in recent years (Bongaarts and Watkins 1996), they also raise the possibility that the commitment or “locking-in” to particular configurations will have wider and more serious consequences. In the remainder of this article, I review the history of the promotion and adoption of modern contraceptive methods in Mexico and Brazil from this perspective. In each case, I consider what happened in the early stages of adoption and then assess the problematic aspects of contemporary contraceptive practice that had their origin in the earlier period. In both countries, doctors appear to have played an important role in the choice process and to have been heavily influenced by the behavior of their peers.

## Mexico

### Extending the national family planning program to rural areas: 1977–86

The Mexican government launched a population policy in 1973 with a view toward reducing the rate of population growth, but not until 1977 was a concerted decision made to promote family planning in the rural areas of the country.<sup>13</sup> The rural population had much higher rates of fertility and much lower contraceptive prevalence than the urban population. Although rural fertility was very high with a total fertility rate of about 7.4 births per woman (CONAPO 1997), it had declined slightly from the peak levels it had reached by the start of the decade. Contraceptive practice, which was virtually nil as late as 1970 (García 1976), had increased to the point where 14 percent of married women were using some kind of method. Rural Mexico was characterized by widespread poverty, a virtual absence of employment in nonagricultural activities, and dispersed villages. Most outside observers as well as those involved in implementing the population policy regarded the task of promoting increased contraceptive practice and lower fertility in rural areas as a major challenge (Alba and Potter 1986; Jain 1998).

The public health institutions to which this task was delegated embarked on a major initiative to extend their reach into rural areas. The Min-



istry of Health's (SSA) Rural Health Program began by recruiting community health workers in over 11,000 communities (Elu de Lenero 1982). In the later years of the 1976–82 administration of President Lopez Portillo, after an unforeseen change in the cabinet, this program gave way to a much better-endowed rural health program administered by the Mexican Institute of Social Security (IMSS). Instead of relying on the existing infrastructure as the SSA program had, this initiative involved building over 3,000 rural health clinics and some 73 regional hospitals (Alarcon and Martinez 1986). Drawing on the regular IMSS infrastructure, but targeted toward people living in places with fewer than 2,500 inhabitants who were not yet served by any of the public institutions, the IMSS-COPLAMAR<sup>14</sup> program greatly increased the number of physicians—for the most part interns performing their required year of social service—practicing in rural Mexico.

In these rural programs, SSA and IMSS each placed strong emphasis on family planning, intending to make services and supplies available in the villages and promoting their use (Alarcon 1982; Potter, Mojarro, and Nuñez 1987). To motivate the doctors, nurses, community health workers, and *parteras* (traditional birth attendants) to recruit new acceptors of hormonal methods, the IUD, and female sterilization, the administrators assigned hospitals and clinics monthly targets for new acceptors. These targets were usually method-specific, and, especially in the IMSS program, the highest priority was assigned to the IUD and female sterilization. The critical statistic for public hospitals and maternity clinics was the percentage of mothers who accepted one of these methods immediately following delivery.

To get a perspective on how providers responded to the program, in 1984 colleagues at IMSS and I visited a representative sample of villages with fewer than 2,500 inhabitants in the 1970 census that had fallen within the sampling frame of the 1981 Rural Survey of Family Planning. Most of the doctors and nurses and many of the midwives providing maternal and child health services to the selected villages were interviewed, irrespective of whether they practiced in the village or in a nearby town, or whether they were in the public or private sector. We were interested in learning how these providers perceived their own situation vis-à-vis the program, how they viewed their clients, and what they did to recruit acceptors. The information obtained in this survey provides a glimpse into the early history of the spread of modern contraceptive practice in rural Mexico.

For the large majority of doctors in the public health institutions whom we interviewed, people's fear of modern methods was the greatest obstacle to recruiting contraceptive acceptors. In the perception of doctors, resistance to family planning derived much more from rumors concerning the health effects of contraception than from lack of motivation to regulate fertility. Fully 90 percent of the doctors and 94 percent of the nurses in our sample believed that their patients were afraid to use particular methods. They were



especially emphatic with respect to the fear that women had of the IUD, and fear, rumors, and misinformation were the main reasons they gave for the lack of demand for the method.<sup>15</sup> Ninety-one percent of the doctors and 83 percent of the nurses responding reported that their patients were afraid of tubal ligations.

Most doctors and nurses said that when they encountered a woman who was afraid to use a method, they would try to convince her that it would do no harm. Besides providing an understandable explanation of how the method "worked" or what was involved in its use, their principal means of convincing clients of the safety of a method was to point to women in the community who were using it successfully. By drawing upon their own clinical practice to promote the exchange of positive experiences between women, they quite consciously attempted to foster diffusion. Their strategy in promoting family planning was to continue mentioning the topic and insisting on its merit. Once a few people came to accept the idea, they could be used as examples to bring others around.

The doctors, nurses, community health workers, and traditional midwives who promoted family planning in rural Mexico were themselves closely tied together by the public health institutions that employed or engaged them. The doctors in the small rural clinics were visited regularly by their supervisors, and the community health workers and midwives were called to attend quarterly meetings for training and to exchange experiences. Those responsible for districts or regions were, in turn, called to state or national-level meetings. As a result of this socialization and in response to the guidelines and priorities transmitted down the chain of supervision, the practitioners we interviewed gave nearly uniform answers to our questions regarding the type of methods they would recommend under different circumstances, and believed that the IUD and female sterilization were suitable postpartum methods. They also agreed on the number of children women should have and on how the birth of these children should be spaced.

In retrospect, the early phase of the Mexican program successfully met many of the objectives that had been set for it. The prevalence of contraceptive use among married women of childbearing age in rural areas increased from 14 percent in 1976 to 27 percent in 1981 and 33 percent in 1987. The emphasis was on recruiting acceptors and lowering the rural fertility rate, and at least the hospital-based portion of this program appears to have made a significant contribution to these goals (Potter, Mojarro, and Nuñez 1987). Clearly, the Mexican program also fostered an interventionist style of acting on the part of the personnel who were charged with putting it into practice. Mexican authorities responsible for health and population policy would later find this manner of promoting family planning unacceptable and ineffective, but during the first decade of the program the style became entrenched.

### The problematic reliance on postpartum contraception in contemporary rural Mexico

The opening of the Mexican political system and developments in the international arena such as the international conferences in Cairo and Beijing changed the context in which the Mexican national family planning program functions. The number of institutions and organizations that take an active interest in family planning, population, and the status of women has increased markedly. Many of these institutions and organizations are both responding to and fomenting demands for greater autonomy and a wider and improved array of services related to maternal health care and contraception. Some, such as the Catholic Church, the Partido de Acción Nacional, and a number of the organizations representing women's interests, are openly critical of the government's actions in this area. As a consequence, both the visibility and the political repercussions of population policy issues are now much greater than they were a decade ago.

The second major change in context is the decline in fertility and the increase in contraceptive practice that have taken place. The total fertility rate for rural Mexico in 1995 is estimated to have fallen below four, and contraceptive prevalence among married women was about 53 percent.<sup>16</sup> Shown below, for married rural women, is the proportion of current users relying on various methods of contraception in 1995 as well as in 1981, when prevalence was about half the 1995 level. The table shows a concentration of use in 1995 among just two methods, female sterilization and the IUD. The proportion of use accounted for by these two methods more than doubled over the 14-year period, while the share of hormonal methods fell sharply.

	Sterilization	IUD	Pills	Injectables	Barrier methods	Others	Total (any method)
1981	20.5	8.8	35.1	11.4	2.1	22.1	100.0
1995	39.6	23.5	10.9	5.5	4.6	15.9	100.0

SOURCES: Encuesta Rural de Planificación Familiar, 1981; Encuesta Nacional de Planificación Familiar, 1995

In light of the increase in prevalence and the decline in fertility, the challenge facing the government program in rural areas is no longer solely to introduce the concept of, and overcome resistance to, fertility limitation. Rather the current goals are to reach those segments of the rural population that have low rates of contraceptive prevalence and to promote changes in the timing of fertility by delaying the first birth and increasing the spacing between subsequent births.<sup>17</sup> With respect to the latter goals, however, the heavy emphasis on postpartum IUD insertions and tubal ligations pre-

sents cause for concern. IUDs are rarely used prior to the first birth, and the demographic impact of the high rates of surgical sterilization is limited since the procedure is mostly performed on higher-parity women who would not have many additional children. Indeed, the 1995 survey indicates that among rural women who were sterilized since 1990, 52 percent had five or more children and 27 percent were over age 35.

There is also concern among Mexican authorities regarding access to both sterilization and the IUD since most of these procedures are performed immediately following delivery in public hospitals. The use of these methods is limited among women who deliver in private maternity clinics or who deliver at home with a traditional midwife—the latter are usually the poorest women and those who live in remote villages. The table below shows the distribution of mothers in 1990–95, in percent, by contraceptive use according to place of delivery. In particular, it highlights the proportions of mothers who accepted either an IUD or sterilization following the birth of their last child, distinguishing between postpartum and later procedures. This table refers only to the rural respondents from the nine states that were assigned high priority by the national family planning program and that were sampled most heavily in the detailed survey of family planning (ENAPLAF) undertaken by CONAPO in 1995.<sup>18</sup>

**Contraceptive use (percent) among mothers by place of last delivery**

	<b>IMSS hospital N=668</b>	<b>Other public hospital N=534</b>	<b>Private hospital N=492</b>	<b>At home/ traditional midwife N=1147</b>	<b>All places N=2841</b>
Postpartum IUD	28.7	10.3	3.8	0.1	9.4
Postpartum sterilization	20.3	22.3	13.3	1.8	11.6
Later IUD or sterilization	9.8	9.8	10.1	8.5	9.3
Currently using another modern method	10.6	15.9	23.6	9.4	12.9

The last row in the table shows the percentage of women who had a child since 1990 who are currently using a modern method of contraception other than the IUD or sterilization. Postpartum procedures are far more frequent in public than in private hospitals, but private patients make greater use of other modern methods. The large number of women who deliver at home, with a traditional midwife, have no access to postpartum IUDs or sterilization, make only moderate use of these methods later in the birth interval, and are relatively unlikely to be using any other modern contraceptive methods.

Besides its limited demographic impact, another problem with the government program relates to the way acceptors of IUDs and female steriliza-

tion were recruited in public hospitals. In the rural areas of the nine states, 52 percent of current users of the IUD had the device inserted immediately following their last delivery while they were still in the hospital. This proportion was 67 percent for IUD users who obtained the method from IMSS hospitals and 36 percent for users who obtained the IUD from another public institution. Between them, these two sources account for 93 percent of all current IUD users in these rural areas. Some questions included in the 1995 survey asked about the procedures that were followed when women had their IUDs inserted. The responses indicate that the interventionist style fostered in the early phase of the Mexican program has remained prevalent more than a decade later. The decision to use the IUD was often made very close to the time of insertion, without following an appropriately elaborate procedure guaranteeing informed consent.<sup>19</sup>

Evidence from the survey regarding postpartum sterilization also warrants concern. Of all rural women who were sterilized since 1990 in the nine states, 84 percent were operated on in a public-sector institution: 53 percent in IMSS hospitals and 31 percent in other public institutions. Of these public-sector sterilizations, 70 percent were performed immediately following delivery in IMSS hospitals and 74 percent in other public hospitals. The decision to operate was taken while the woman was in the hospital in 42 percent of the IMSS postpartum sterilizations and 32 percent of the other public cases.

These survey results are indicative of heavy-handed tactics by medical personnel, and certainly suggest procedures that diverge from the guidelines for the government family program that were adopted in 1994 following the Cairo conference. In that year, in line with international recommendations, administration of family planning services was relocated to a Reproductive Health Directorate in the Ministry of Health, and a uniform set of Normative Guidelines was established to cover the implementation of family planning services in all public-sector institutions. The emphasis in the Guidelines as well as in the rhetoric of the government program was on guaranteeing freedom of choice and improving the quality of the care provided, rather than on meeting specific targets for the number of acceptors and contraceptive prevalence.

To investigate the seeming divergence between rhetoric and practice and to assess the quality of family planning services provided to the population of the nine priority states, in late 1996 CONAPO undertook a survey of the clinics, hospitals, and practitioners providing family planning services in the communities included in the ENAPLAF sample. Analysis of these data is in progress, but several conclusions can be drawn from the initial tabulations. Prominent among them is that the Normative Guidelines are not widely known or disseminated. Among the practitioners who responded to the survey, only 40 percent of medical doctors in public institutions reported having seen a copy of this document in the institution where they

worked, and less than a third of these doctors claimed that they consulted it regularly. On the other hand, all doctors questioned were well aware of the targets that existed for family planning acceptors. Virtually all of them said that their institution had numerical family planning targets, and more than half of the doctors had targets set for their own personal performance.

In many respects, the story told by the doctors in 1996 was similar to the one we heard in 1984. The doctors recognized the need for family planning in rural areas, and they believed that rural women would be better off having a limited number of children. In 1996, as before, the doctors believed that women were afraid of the IUD and surgical sterilization because of rumors and inaccurate information, but that these were the most effective methods and the ones they recommended most frequently. However, with the larger presence and coverage of the public health institutions, and many more acceptors of the two methods they promoted most intensively, the government program had come to predominate over private medical sources of modern contraception or other indigenous or market-based approaches to seeking contraceptive advice or supplies.

This point may be illustrated with an exceptional experience that proves the rule. In 1998, my colleagues and I went to a remote and impoverished town where the respondents in 1995 had included an unusually high proportion of users of the rhythm method. Rhythm was still the predominant method. Its use in the village had been initiated by a local mother who had become a community leader and recommended the method to others. Community members, in turn, had resisted the efforts of the nearest IMSS clinic to persuade mothers to adopt other, more effective methods. This "independent" village contraceptive history, which closely resembles those reported by Entwistle et al. (1996) for the Nang Rong villages in Thailand, was anomalous in the Mexican context where the government institutions almost always overrode local initiatives.

The 1995 survey of women and the 1996 survey of medical practitioners both point to the persistence of a particular way of promoting and practicing contraception that had originated 15 to 20 years ago. This pattern was the outgrowth of directives issued in the early stage of Mexico's national family planning program. These in turn became institutionalized in the IMSS and the Ministry of Health and as recently as 1998 appeared to be resistant to the directives and guidelines issued in response to the pronounced changes that have taken place in the demographic and political context. No one in or out of the Mexican government would argue that the situation is set in stone, but meaningful reform clearly constitutes a difficult challenge. Not only is there a need to raise women's awareness of the options that should be open to them, but a substantial investment is required to motivate medical practitioners and program administrators to develop alternative ways of providing family planning services.

## Brazil

### Adopting modern contraception in the presence of supply restrictions: 1964–80

The early stage of the process of adopting modern contraceptive methods in Brazil is less well documented than it is in Mexico. Nevertheless, one may identify circumstances that led to predominant dependence on the pill and female sterilization and that promoted a clearly inferior technology for performing the latter. The initial period of the Brazilian fertility transition may be identified as extending from the mid-1960s until 1980. A sample survey of urban women showed the fertility levels and contraceptive prevalence existing in 1964 in Rio de Janeiro, where control of marital fertility first appeared in Brazil. The total fertility rate was about 3.7, but there was little use of modern contraception. Fewer than 3 percent of married respondents were using the pill, 6 percent were sterilized, 10 percent used a barrier method, while 20 percent employed traditional methods such as the douche, rhythm, and withdrawal (CELADE and CFSC 1972). Fertility in the rest of the country was much higher, and use of contraception was much less prevalent. The total fertility rate for Brazil as a whole in the early 1960s was about six (Bercovich, Martins, and Oliveira 1994).

By 1975–80, the national total fertility rate had fallen to about 4.3, and fertility was declining in virtually all of the heavily populated regions of the country including the impoverished Northeast, where fertility had been very high (Committee on Population and Demography 1983). Contraceptive practice centered on the pill and female sterilization. The survey information for this period was collected in contraceptive prevalence surveys conducted in the highly industrialized southeastern state of São Paulo and in the northeastern states of Piauí, Bahia, Paraíba, Pernambuco, and Rio Grande do Norte.<sup>20</sup> Use of contraception among women in union aged 15–44 varied from 64 percent in São Paulo to 31 percent in Piauí. The percentage of these women using particular methods of contraception in these two states is shown below:

	Pills	Female sterilization	Condom	Rhythm	Withdrawal	Other	Any method
São Paulo	27.9	15.6	6.5	5.2	7.3	1.4	63.9
Piauí	10.1	15.4	0.1	2.6	2.5	0.2	30.9

SOURCE: Population Information Program (1981).

The surveys showed negligible use of IUDs or injectable contraception in either state. The ratio of sterilization to pills is much higher in Piauí than

in São Paulo, while the use of traditional methods is much lower in Piauí. Before turning to the evidence on the proportion of sterilizations conducted during cesarean sections in this period, a brief description of the institutional context in which this process of contraceptive adoption was taking place is pertinent.<sup>21</sup>

The 1964–80 period in Brazilian history began with a coup that led to 25 years of military government. Among the coup's more immediate effects were the suppression of many forms of public debate and expression and the initiation of massive efforts to promote industrialization and national integration. The Brazilian state made substantial commitments to expanding consumer credit, telecommunications, social security, and health care, and very substantial increases in the reach of all of these services were achieved in the post-1964 period (Faria 1989).

In the context of extreme income inequality and expanding public investments, there was a major transformation in Brazilian medicine and public health policy toward specialized, hospital-based curative care in place of the prevention and control of the "diseases of underdevelopment."<sup>22</sup> The 1964–80 period witnessed a sharp rise in hospitalizations, especially for surgical interventions in private hospitals affiliated with the social security system. Following the reform and unification of the social security system in 1967, hospital admissions grew by more than 400 percent in ten years (Rodrigues Filho 1991). Between 1971 and 1980, the number of hospital admissions paid for by the social security system in urban areas increased from 2.9 million to 9.6 million, while the percentage of the entire population admitted to a hospital during one year increased from 3.2 percent in 1971 to 8.8 percent in 1979. By the end of the period, 76 percent of all hospital care was paid for by the social security system, and 80 percent of medical facilities with beds belonged to the private sector (World Bank 1994). This rapidly expanding, publicly funded, yet highly privatized medical system had to meet the demand for contraception and birth limitation that emerged during this period.

Despite the attention given to the evolving position of the Brazilian government on population issues (Fonseca Sobrinho 1993) and to the activities of organizations such as BEMFAM, the International Planned Parenthood affiliate (Martine 1996), most of the response to the demand for contraception in Brazil took place in the private medical sector. Pills manufactured in Brazil were sold over the counter in pharmacies beginning in the early 1960s. Annual production rose steeply from 1.7 million cycles in 1964 to 13.5 million cycles in 1970 and to 61.2 million cycles in 1980. Besides regular commercial distribution through pharmacies, a significant number of cycles were distributed by BEMFAM, but in 1976 these amounted to only about 9 percent of all the cycles produced in Brazil (Merrick and Berquo 1983).<sup>23</sup>



One of the main reasons underlying the demand for surgical sterilization in Brazil was that many women found the pill to be an unsatisfactory method of birth control for long-term use.<sup>24</sup> The provision of sterilization, however, was complicated by regulations that made its practice virtually illegal and prevented physicians and hospitals from seeking reimbursement for procedures under the government's medical insurance program that funded about 80 percent of the surgical procedures being performed in Brazil. For physicians as well as hospitals, the remunerative way out of this regulatory dilemma involved the use of cesarean section deliveries. During this period, the reimbursement for a cesarean delivery was greater than for a vaginal delivery. This fact, combined with the argument that a cesarean section exposed a woman to high health risks in case of further pregnancies, contributed to creating a rationale for performing sterilizations during cesarean sections. The doctors and hospitals profited since the cost of the tubal ligation was subsumed under the cost of the cesarean delivery by the hospital, and the attending physician might also receive a side payment.<sup>25</sup> For women, the opportunity to obtain a sterilization whose costs were covered by health insurance presumably made a cesarean delivery an attractive alternative, even among those whose previous delivery had been vaginal. Moreover, among the growing number of women who were giving birth to a first or subsequent child by cesarean section, the possibility of a progressively weakening uterus constituted an additional motivation for obtaining a sterilization (Faúndes and Cecatti 1993).

In view of the formal restrictions on sterilizations and the limited number of contraceptive options available, this system made sense to both women and obstetricians. Undoubtedly, it also led to a substantial increase in the prevalence of unnecessary cesarean section deliveries, with consequent increases in maternal morbidity. Prevalence surveys conducted in 1980 in the northeastern states of Bahia, Paraíba, Pernambuco, and Rio Grande do Norte record that of all women who had been sterilized, about 60 percent were sterilized during a cesarean delivery (Janowitz et al. 1985). Data for later periods suggest that the proportion of sterilizations performed during cesarean deliveries was considerably higher than this level in other regions of the country.<sup>26</sup>

The contraceptive adoption process in the early years of the Brazilian fertility decline contrasts sharply with that in Mexico. Most services were provided by private physicians, hospitals, and pharmacies rather than by government doctors, hospitals, and clinics. Moreover, government regulations in Brazil tended to restrict rather than promote the use of contraception. Yet, during this period, a formally illegal method of birth control gained widespread acceptance by women and physicians, all of whom were clearly responsive to the prevailing set of incentives and who together developed a seemingly perverse but innovative contraceptive culture. This process in-

volved the rejection of alternative technologies, notably the IUD, which was promoted so energetically in Mexico but which never gained a foothold in the Brazilian market in spite of a number of experimental research projects that pioneered its use.<sup>27</sup>

### **The narrow mix of methods and the high rate of cesarean sections in contemporary Brazil**

Between 1980 and the mid-1990s, Brazil experienced the gradual advent of democratic elections for municipal, state, and federal government posts and the end of a long period of military rule. Along with democratization came a large increase in the number and vitality of the organizations involved in public discussions regarding family planning, population, and women's health and empowerment. Out of the ensuing debate, the Program of Integrated Assistance to Women's Health (PAISM) was conceived in 1983 and instituted in 1986 with the objective of providing comprehensive health care for women of reproductive age, including the provision of a wide array of contraceptive services by publicly financed health centers. While PAISM remained more a set of aspirations than a functioning system during its first decade (Costa 1992 and Corrêa 1993), it served to crystalize debate as democratization proceeded. Finally, the 1994 International Conference on Population and Development served as a catalyst to define and propagate Brazil's position on issues related to family planning and reproductive health.<sup>28</sup>

While the Brazilian government guarantees women the right to an adequate supply of contraceptive services to be provided by publicly financed health services, in contrast to the Mexican policy it does not promote fertility decline, nor does it set targets with respect to population growth or the adoption of contraception. Implementation of PAISM also coincided with a reform in the government's procedures for financing health care that involved a considerable delegation of authority to state and municipal governments and limited the ability of the federal Ministry of Health to implement national policies of this sort. Two further policy developments related to the use of cesarean section deliveries and surgical sterilization deserve mention. First, starting in the late 1970s in response to the rapid increase in the rate of cesarean deliveries, the schedule for reimbursing deliveries was adjusted so as to reduce and eventually eliminate the premium paid for cesarean as compared to vaginal deliveries. Second, the Brazilian Congress passed legislation in August 1997 intended to legalize and regulate the use of sterilization in public hospitals. I return to this law and the current policy issues confronting the Brazilian government after reviewing the recent evolution of contraceptive practice.

Two nationally representative sample surveys collecting data on contraceptive practice in Brazil were carried out in 1986. In that year, BEMFAM

conducted a Brazilian round of the Demographic and Health Survey (DHS), and the Brazilian Institute of Geography and Statistics added a module on contraceptive practice to the annual National Sample Survey of Households. In 1996, there was a second DHS, again implemented by BEMFAM. While these surveys revealed a large increase in the practice of contraception, with prevalence among married women reaching 66 percent in 1986 and 77 percent ten years later, the 1996 survey also showed an apparent further narrowing of the mix of methods practiced in Brazil. The percentage of currently married women aged 15–44 currently using particular methods is shown below for the 1986 and 1996 surveys:

Year	Orals	Female sterilization	Condom	Rhythm	Withdrawal	Other	Any method
1986	25.2	26.9	1.5	4.2	4.4	3.6	66.0
1996	20.7	40.1	4.4	3.0	3.1	5.4	76.7

SOURCES: National Survey of Maternal and Child Health and Family Planning, 1986 (DHS); National Survey on Demography and Health, 1996 (DHS).

The proportion of all contraceptive practice accounted for by female sterilization among married women rose from 41 percent to 52 percent during the ten years. Use of oral contraceptives declined over the decade, but in 1996 it remained the only other widely used modern method of contraception.

The ever-increasing reliance on surgical sterilization evident in these data seems to run counter to PAISM's stated goal of making a broad array of methods available to the population, and counter to the continuation of restrictions on the use and availability of surgical sterilization. On the other hand, considering the lack of experience with alternatives to the pill, as well as the apparent desire of mothers of two or more children to terminate their childbearing, it is logical that the use of female sterilization that had first manifested itself in Brazil in the 1970s would have increased in subsequent years. What is less understandable is why the unusual way of performing these procedures that emerged in the earlier period would also have persisted to the present time. Not only had there been changes in the meantime in the schedules for reimbursing hospitals for different types of delivery, but hospitals relying on the government health insurance system were coming under increasing pressure to control their costs by, among other things, limiting the number of unnecessary surgical interventions.

Data from the 1996 DHS referring to the sterilizations performed in the five years preceding the survey show that for the country as a whole, 60 percent of sterilizations were performed during a cesarean section. This fraction was by no means uniform throughout Brazil. While the fraction of sterilizations conducted during a cesarean was only 40 percent in the North-

east, it was 71 percent in the rest of the country. Leaving aside the question of how and why the practice of sterilization is so different in the Northeast, the finding that conforms to the general argument being advanced in this article is the persistence, in most parts of the country, of a technology for carrying out sterilizations that reflects incentives that prevailed decades earlier.

The practice and consolidation of surgical delivery and surgical sterilization in Brazil were, of course, mutually reinforcing phenomena. The high fraction of sterilizations performed during cesarean sections derives from the high fraction of all births delivered surgically. Not only does a cesarean present an opportunity to perform a sterilization, but the fact of having had multiple cesareans is a justification and motivation for sterilization. The following table shows the proportion of births delivered by cesarean section during 1991–96. There is a pronounced differential according to the type of hospital where the birth took place, and in the Northeast as compared to the rest of the country. The most telling statistic is that some 72 percent of all births at private hospitals that do not accept government health insurance are cesareans. Cesareans, on the other hand, constitute less than a third of all births in public hospitals, and 45 percent of all births at private hospitals, the so-called *conveniados*, that accept government health insurance. In general, there is little variation in the cesarean rate by birth order such that, in a given type of hospital, the overall rate is similar to that for first births. Finally, there is a large difference in the prevalence of cesareans between the Northeast region and the rest of Brazil, with cesareans being less frequent in the Northeast.

Birth order	Type of hospital			Region		
	Private (N=605)	Public (N=3064)	Conveniado (N=763)	Northeast (N=2755)	Rest of Brazil (N=2226)	Brazil (N=4981)
1st	70.6	33.1	46.2	24.2	46.9	40.1
2nd	74.0	36.1	50.0	26.3	51.9	44.2
3rd	76.4	33.8	52.8	26.1	49.4	41.3
4th and higher	53.5	21.6	22.5	9.3	27.4	18.7
All births	71.5	31.6	44.5	20.6	45.6	36.9

SOURCE: National Survey on Demography and Health, 1996 (DHS).

The original pattern in which sterilization was closely tied to cesarean sections is still dominant in most of Brazil. Apart from the Northeast, 71 percent of all sterilizations are performed during cesarean sections, and 46 percent of all births are cesareans. It is difficult to know how much of the increase in the prevalence of cesareans over the last 25 or 30 years was motivated by a desire to obtain a sterilization, and how much of the increase in

the use of sterilization was motivated by a history of cesarean sections. Evidence points to the importance of both lines of causation. Moreover, much of the increase in both surgical delivery and surgical contraception occurred long after the original financial incentives favoring cesarean sections had been removed and a national policy had been instituted to promote the use of alternative methods of contraception.

Consideration of the ways in which Brazilian women and their doctors came to depend on this technology is complicated by the interdependence of choice involving type of delivery and type and timing of contraception. Nevertheless, positive reinforcement seems to be present at a number of levels. For instance, with reference to the emergence of "cultures" of sterilization and of cesarean section deliveries, women who have had either a sterilization or a cesarean are especially likely to have other relatives, such as a mother or a sister, who have also undergone the procedure (Berquo 1993). Without doubt, the prevalence and frequency of cesarean section deliveries render these procedures less exceptional than they might appear in other settings, and women are likely to know few people who are practicing a method other than sterilization for fertility limitation. But, as in the Mexican case, the most compelling examples of positive reinforcement pertain to the choices made by doctors.

The medical community avers that Brazilian doctors are more skilled than doctors in the United States at performing cesarean section deliveries. Brazilian doctors pioneered the "bikini cut," and they note disapprovingly the larger and higher scars left by many North American obstetricians. While such local pride may seem misguided, it is evident that considerable learning has taken place and that most Brazilian obstetricians have ample practice in performing cesarean section deliveries. Furthermore, because cesarean deliveries in private hospitals are common, the doctors who perform most of their deliveries by cesarean section are well protected against possible charges of malpractice and can count on collegial support. The social interactions and professional reference groups for obstetricians also extend beyond the hospital. They often have close links to their former classmates or professors in medical school, and most of them are active members of medical associations at the state, regional, and national levels. Medical schools and associations, in turn, have played a decisive role in the consolidation of a permissive environment for the use of cesareans (Faúndes and Cecatti 1993).<sup>29</sup>

The reduced reliance on cesarean sections as the means of performing sterilization in the Northeast region requires further explanation. The emergence of this divergent pattern seems to reflect the smaller fraction of the population enjoying middle-class or high incomes in the Northeast and the much smaller proportion of deliveries that take place in private hospitals. In the face of substantial unmet demand for sterilization within the popula-

tion unable to afford private care or to obtain a cesarean delivery in a public hospital, local doctors and politicians have developed alternative ways to cover the costs of sterilization performed independently from a cesarean section (Potter and Caetano 1998). These arrangements are often based on a promise of electoral support whereby the woman expecting to be sterilized agrees to vote for the political party or individual providing or paying for the procedure. As such, the arrangements seem to constitute another instance in which the demand for fertility control has led to a perverse pattern of medical practice.

### Policy responses in Mexico and Brazil

The situations described in these two countries have elements of path dependence leading to the persistence of outmoded contraceptive regimes. In both instances, many of the factors that prompted the initial policies and the responses they engendered have been removed, yet the patterns have persisted or have become even more pronounced. At present, there is consensus regarding the undesirability or the problematic features of each situation, and steps are now being taken in each country to correct matters. It is unclear, however, how “locked-in” these countries are to their present regimes, hence how much effort will be needed and how long it will take to bring about change.

In Mexico, the problem is to change the way that the public health institutions promote family planning. The two corrective initiatives already underway involve the implementation of strict informed-consent procedures with regard to IUD insertions and sterilizations, and efforts to increase the familiarity of practitioners with the official norms regarding the provision of contraceptive services. Longer-term efforts to upgrade the knowledge, skills, and qualifications of the doctors and nurses who staff family planning clinics and who see patients during prenatal care, delivery, and postpartum care are also envisaged, as are efforts to educate rural women about their reproductive rights.<sup>30</sup>

These efforts involve large institutions, many thousands of professionals practicing in thousands of localities, and a health bureaucracy that is now largely decentralized to the state level. Change in the nature and quality of the services the health institutions provide is likely to be difficult. Some of the more objectionable practices related to IUD insertions and sterilizations have now been controlled by way of strongly worded administrative directives, but the way programs relate to their clients may well prove more resistant to change. These institutions have been providing family planning services for nearly 25 years, and their modes of operation have considerable inertia.

In Brazil, legislation was passed in August 1997 intended to legalize and regulate the use of sterilization. Its specific goals were to reduce the

number of sterilizations that are undertaken prematurely, to increase the use of methods other than the pill and sterilization, and to reduce the number of cesarean section deliveries. The law authorizes the public health financing system to reimburse hospitals and clinics for performing sterilizations, but specifically restricts the use of postpartum sterilization to those cases where there is a compelling medical justification. Moreover, it requires institutions that provide sterilizations to offer counseling not only on the nature and consequences of the procedure but also on alternative ways of preventing pregnancy. In implementing the new law, Ministry of Health officials have been careful to respect the stipulations regarding the conditions under which sterilizations may be performed, and only hospitals or clinics that have been authorized to seek reimbursement for the procedure may do so. But this means that, to date, there has been only a modest increase in the availability of sterilization in the public health care system.

Policymakers recognize the role that the previous limitations on financing sterilizations through the public health system played in motivating women to seek a cesarean-based sterilization in the private sector, or to exchange their vote for a sterilization in the Northeast. But immediately satisfying the frustrated demand for sterilization would have led to a large number of postpartum procedures and an even greater imbalance in the method mix. The extent to which policymakers are attempting to control and influence the behavior of medical providers and their potential clients underscores the degree to which they perceive both parties to be committed to the very patterns they hope to change. At the same time, their attempt to implement the new law only gradually means that in the short run little will be done to eliminate the distortions inherent in the current system.

## Conclusion

The patterns of contraceptive delivery and practice that emerged in rural Mexico and in Brazil were strongly influenced by circumstances that were present in the early phases of the respective fertility transitions, but that have long since disappeared. In the present circumstances, these patterns are highly problematic. At the same time, they are well entrenched and have an inertia that makes it unlikely they will be quickly or easily reversed by the policies that are now being considered or implemented to correct the situation. This dynamic is consistent with and, I suggest, is driven by the wayward logic of path dependence.

The concepts of increasing returns and path dependence are helpful in thinking about the fertility transition and the pattern of change in contraceptive practice. They provide an alternative perspective on some of the questions now prominent in the debates over population policy and reproductive health. Path dependence provides a way of understanding how in-



dividual societies around the globe might have adopted widely differing mixes of contraceptive methods and have become committed to a variety of contraceptive cultures. It is not an explanation for this diversity, since it refers responsibility back to seemingly insignificant or accidental historical circumstances and the erratic dynamics of positive feedbacks; but it should stop us from looking for answers solely in terms of deep-seated cultural preferences or the present-day incentive structure.

The concept of path dependence is closely related to the anthropological critique of diffusion (Kreager 1993). By addressing the issue of optimality, this complementary formulation also seems to strengthen the original critique. Not only is the outcome of the process of technology adoption open-ended, but there is no guarantee that the process will lead to the best outcome. While the anthropological critique questions the linear characterization of the adoption process offered by the proponents of diffusion, the logic of path dependence highlights the possibility that the process may go astray. This should temper confidence that social networks and social interaction will serve as engines of change for the better. While they undoubtedly contribute to the speed of fertility transitions, there is no guarantee that in every respect they will lead to a satisfactory outcome.

Another point of contact with current debates has to do with the emphasis on rights, options, and quality of care embodied in the Program of Action hammered out at the International Conference on Population and Development. The arguments advanced in this article share much common ground with the feminist critique of the status quo vis-à-vis contraceptive practice and delivery systems. There is ample reason for concern about the quality of care and the range of contraceptive options available to women. The feminist critique also addresses the problematic aspects of the fertility transitions that have occurred over the last four decades and of the existing state of contraceptive regimes, and emphasizes the problems that have to be dealt with rather than the accomplishment of attaining lower rates of fertility. Feminist critiques are also articulate about the specific ways both providers and women are committed to the status quo, and the difficulties they face in attempting to establish alternative systems and adopt alternative behaviors (Diaz and Rogow 1995).

Finally, the notion that remote historical events may, over time and through the logic of increasing returns, result in contraceptive practices and delivery systems that are far from optimal has important if somewhat contradictory implications for public policy. On the one hand, the notion suggests that the transition should be monitored and regulated since it can take an undesirable path that may become entrenched in the absence of prompt and potent corrective actions. The case of Brazil seems to support such an interpretation: remedial measures were "too little, too late." On the other hand, while the presence of increasing returns implies that unregulated

market outcomes will not always be efficient, the impact of early efforts to hasten and direct the transition may also be amplified and perpetuated in an undesired direction by the type of dynamics described here. The persistence in Mexico of a heavy-handed, hospital-based family planning program serving the rural population provides a telling example of an approach that outlived the problems it was designed to solve.

## Notes

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1 Some of the most influential publications have been Bongaarts and Watkins (1996), Watkins (1987 and 1990), Montgomery and Casterline (1996), Montgomery and Chung (1999), and Rosero-Bixby and Casterline (1994).

2 Earlier publications reaching a similar conclusion are Coale (1973), Knodel and van de Walle (1979), Watkins (1987), and Cleland and Wilson (1987).

3 For example, Bulut et al. (1997) seek, albeit unsuccessfully, an explanation of the high use of withdrawal in Turkey in terms of the reproductive morbidity experienced in the population. Goldberg and Serbanescu (1995) have considered how the economic and political history of Romania and the Czech Republic account for the low use of modern methods in those countries. But perhaps the most intriguing is Coleman's (1981) study of the factors underlying the high use of condoms in Japan. He ends up suggesting that

"a large proportion of Japanese married couples who are using condoms are not particularly pleased with the method" (p. 36), and that "Japanese couples' extensive reliance on condoms results largely from the unavailability of other methods, in a cultural context of embarrassment and passivity toward contraception" (p. 29).

4 Quantitative evidence on the importance of health concerns has been captured, albeit summarily, by Demographic and Health Survey questionnaires. See Bongaarts and Bruce (1995) and Lesthaeghe (1998).

5 Rutenberg and Watkins (1997) provide a recent account of the importance given to health concerns and side effects in evaluative conversations about contraceptive methods in Nyanza Province, Kenya.

6 Leal (1994) provides an excellent description and analysis of the ways that people's understanding of the reproductive system can impinge on use of pills.

7 A second but indeed prior function of doctors is to motivate the use of contraception or sterilization. There are many ways that medical personnel may attempt to motivate use, but they have a particular advantage in drawing attention to the deleterious health consequences of continued childbearing for the mother. They may also point to the positive health consequences of a lengthy interval between pregnancies for both mother and child. They may make recommendations that extend beyond their medical competence, and point to the limits of a mother's or a family's capacity to care for and educate a large number of children.

8 One of the clearest statements regarding the potential importance of such guidance was offered by Howard Taylor (1966), an

early advocate of postpartum family planning programs. Taylor held that the medical practitioner who attended a mother's delivery was in a special position to counsel her with respect to family planning. Having been "accorded the role of guide and protector to assure a safe delivery," this practitioner was likely to give advice of "special significance" during the critical postpartum period (p. 436). Moreover, it came at a moment when the mother was likely to have ample motivation to prevent or at least postpone another pregnancy. While Taylor's pronouncements now sound outdated, patronizing, and far removed from the spirit and recommendations of the International Conference on Population and Development, they may be quite representative of the ideology that was imbedded in many of the doctors who were providing family planning services over the past 30 years. Moreover, Taylor's emphasis on the role of trust and assurance seems like a necessary antidote to fear of the health consequences of contraception.

9 For an overview of the literature on effectiveness that highlights the methodological inconsistencies and contradictory findings, see Trussell and Kost (1987).

10 An industrial example is jet aircraft designs such as the Boeing 727 that "undergo constant modification and they improve significantly in structural soundness, wing design, payload capacity and engine efficiency as they accumulate actual airline adoption and use" (Arthur 1989: 116; Rosenberg 1982). Arthur and others have cited numerous technologies such as gasoline-powered motor vehicles and light-water nuclear reactors that, for particular chance reasons, got a head start and came to dominate their market or industry even though the alternative technology probably had greater promise.

11 The following statement by Arthur and Lane (1994), articulating the situation of anyone who must choose between a variety of new technologies, captures the essence of the phenomenon, and has a clear relevance to the problems faced by prospective adopters of new contraceptive technologies:

For the potential purchaser, a new technically based product can be a source of considerable uncertainty. Specifications, advertising brochures, and consumer reports may

be available, and the cost of purchase precisely known. Yet the purchaser may still be unsure about how the product will perform for him: how smoothly it can be integrated into his existing operations; how much maintenance or "down time" the product will require; whether the product in fact is suited to the particular uses he has in mind. . . . In cases like these, usually the potential purchaser tries to reduce this uncertainty by asking previous purchasers about how *they* have fared with the products *they* bought and subsequently used. (p. 70; emphasis in original)

12 While the likelihood of rumors will, of course, increase as a new method becomes more widely adopted, it is not clear that this is a continuous source of decreasing returns. My suspicion is that rumors of serious health consequences constitute an inevitable and possibly lethal threat that surfaces early in the life course of a new contraceptive technology. Either the method survives the threat and continues to grow in acceptance, eventually outrunning the danger, or it succumbs and virtually disappears.

13 The definition of rural is that used in the Mexican census, namely places with fewer than 2,500 inhabitants.

14 COPLAMAR was the acronym for the General Coordination of the National Plan for Depressed Zones and Marginal Groups. In May of 1979 IMSS agreed to provide primary health care to a wide range of disadvantaged rural areas on COPLAMAR's behalf.

15 There was also an acknowledgment of the deleterious influence of actual as well as anticipated side effects of hormonal methods and the IUD. Three-quarters of the doctors believed that such symptoms as excessive bleeding commonly reduce continuation rates for these methods.

16 These estimates are based on unpublished tabulations from the Encuesta Nacional de Planificación Familiar (ENAPLAF) undertaken by the National Population Council in late 1995. More details concerning the design and content of this survey are found below.

17 These goals are clearly set forth in the National Population Program 1995–2000 (CONAPO 1995).

18 These were the states of Chiapas, Guanajuato, Guerrero, Hidalgo, México,

Michoacan, Oaxaca, Puebla, and Veracruz. They contain about half the population of Mexico and account for most of the poorest areas of the country.

19 When the IUD was inserted for reasons of a "medical indication," the mother was informed about the placement of the device only following the procedure.

20 The National Investigation on Human Reproduction carried out in nine purposively selected locations in the states of São Paulo, Espírito Santo, Rio Grande do Sul, Pernambuco, Piauí, and Pará also collected information on contraceptive practice in this period (Merrick and Berquo 1983).

21 There has been an extensive debate in the Brazilian literature concerning the determinants of fertility decline in this period. The central issues concern the various aspects of the Brazilian pattern of development that may have accounted for the emergence of the demand for fertility control, as well as the role played by organizations that were seeking to promote family planning and control Brazilian fertility. The latter are more germane than the former to my present purpose, which is simply to provide a brief historical reconstruction of the environment in which contraceptive decisions were made between 1964 and 1980.

22 Preventive medicine's share of the health budget fell from 64 percent in 1965 to barely 15 percent in 1982. Preventive medicine in this context refers to expenditures on sanitation, immunization campaigns, disease control, and inspection.

23 BEMFAM was, however, a more important source of the pill in the five north-eastern states in which it had cooperative agreements with the state health secretariats (Merrick and Berquo 1983).

24 There is little direct evidence concerning the character and nature of pill use during this period, but on the basis of evidence for the mid-1980s it seems reasonable to assume that medical supervision was often lacking and that complaints about side effects were frequent (Corrêa and Ávila 1989). Moreover, pills were just one of a large number of medications that were widely adopted during a time when the pharmaceutical industry was expanding rapidly, and the pre-

scription and administration of medications were highly problematic for the bulk of the population (Scheper-Hughes 1993).

25 For more complete discussion of the relationship between sterilization and cesarean section delivery in Brazil, see Berquo (1993 and 1995). Direct evidence regarding side payments, albeit for a later period, is given in Vieira and Ford (1996).

26 This is clearly revealed in the maternity history in the 1986 Demographic and Health Survey, which recorded for all births information on whether or not the delivery was by cesarean section.

27 There are two different explanations for the lack of acceptance of the IUD in Brazil. One concerns the considerable discussion that occurred between various groups as to whether use of the IUD constituted a form of induced abortion. This controversial theme arose in congressional inquiries as well as in the scientific and popular press. The other reason is simply the cumulative effect of individual incidents involving serious side effects or accidents resulting from IUD use. The latter explanation seems to most observers to have been the more important of the two (Sonia Corrêa, personal communication, 1997).

28 The Brazilian delegation to the Cairo conference included a broad representation of nongovernmental organizations and played an important role in forging the consensus that emerged in the final conference document. Moreover, following the inauguration of President Cardoso in 1995, a National Commission on Population and Development was set up to coordinate the implementation of the main recommendations of the Program of Action adopted in Cairo (Berquo 1997).

29 Comparatively permissive or generous criteria for the use of cesareans are embedded in several of the most widely used obstetric textbooks published in Brazil, for example Rezende and Montenegro (1992).

30 In January 1998, a memorandum of agreement was signed by officials representing CONAPO and the various public health agencies involved in family planning, setting forth a plan of action for improving the quality of services and ensuring full respect for reproductive rights.

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