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In the past 40 years, Brazil has experienced rapid fertility decline, where the number of children per woman (i.e., total fertility rate) has dropped sharply from 6.0 in the 1960s to 2.3 in the late 1990s. What makes Brazil's fertility decline particularly interesting is its strong reliance on a nonreversible method of contraception: tubal ligation, here referred to as female sterilization. As recently as 1996, the country led the world in recorded rates of female sterilization. This practice is so pervasive and dominant that among some Brazilian scholars it has come to be called the surgical transition rather than the fertility transition. In this paper, we discuss the prevalence of female sterilization and other contraceptive methods among rural women of the Lower Amazon. The use of reversible (e.g., the pill, condoms) and irreversible (sterilization) methods is analyzed in terms of women's birth cohorts and in terms of their individual characteristics. We argue that to understand contraceptive choices we need to consider the social and cultural context, particularly the availability of local health services, the influence of doctors and politicians, as well as women's own goals for themselves and their children.

**Key words:** Brazilian Amazon, rural area, contraceptive use, women's sterilization, contraceptive choices

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## **Introduction**

In the past forty years, Brazil has experienced rapid fertility decline, where the number of children per woman (i.e., the total fertility rate) has sharply dropped from about 6.0 in the 1960s to 2.3 in the late 1990s (IBGE 2000). Several researchers (e.g., Faria 1989; Martine 1995; Potter, Schmettmann, and Cavenaghi 2002) interpret the fast fertility decline observed in Brazil as an unintended and unanticipated consequence of government policies during the military governments (i.e., 1964-85). During that period, medicalization of health, expansion of the social security system, spread of consumer credit, incentives for industrialization and urbanization, and mass education and mass communication, especially television, brought significant economic and social changes in Brazil. Among them was a smaller family pattern (Hamburger 1997; Martine 1995). The fertility decline was first observed in the cities and among middleclass women in the industrialized South and Southeast regions of the country and diffused to the rest of the nation.

What makes Brazil's fertility decline particularly interesting is its strong reliance on a nonreversible method of contraception: tubal ligation (hereafter referred to as female sterilization). The country had the highest recorded rates of female sterilization in the world for many years and as recently as 1996. The Dominican Republic edged ahead in 2002, but it is important to note the difference in total

population between Brazil and the Dominican Republic. This practice is so pervasive and dominant that among some Brazilian scholars it has come to be called the surgical transition rather than the fertility transition (Berquó 1993).<sup>1</sup> This surgical procedure ends a woman's ability to conceive and may be reversible only with another surgical intervention that is not always successful. In contrast, reversible methods, such as hormonal ones (e.g., the pill, injections) and barrier contraceptive methods (e.g., condoms, IUD), interrupt women's ability to conceive only when in use.

The question then must be asked: why are Brazilian women relying so heavily on an irreversible method of contraception? Currently, about 40 percent of all ever-married women between 15 and 49 years old in Brazil are sterilized (IBGE 2000) and about 55 percent of these women had their sterilization during a cesarean delivery (Caetano and Potter 2004), making Brazil a country with one of the highest Caesarean section rates in the world (36.4 percent) (Gomes et al. 1999).<sup>2</sup> For more than 30 years, Brazil led in the number of cesareans. In recent years Chile and other countries have surpassed Brazil (Gómez-Dantés 2004). It may be that legislation in 1997 to decouple the link between cesareans and sterilization has begun to have an effect. It should also be noted that the rate of cesareans in Brazil's public hospitals is much lower (40 percent) than in private hospitals (90 percent). Unlike the United States, which also has a high rate of Caesarean deliveries (21 percent) and cases of female sterilization during cesareans, it appears that at the time of the second Caesarean, doctors in Brazil frequently undertake surgical sterilization (*ibid.*).

Among ever-married women, the pill is the second most used method (20 percent) after sterilization. Other methods, such as barriers, are used much less. Male sterilization through a vasectomy is still rare (2.4 percent), and restricted to more educated men (Berquó and Cavenaghi 2003), mostly in the Southeast and South regions of Brazil. Use of condoms in intercourse has increased in the country significantly in recent decades, mainly as a result of intense HIV prevention campaigns.

The high prevalence of contraception through female sterilization is all the more noteworthy considering the fact that until 1997 it was illegal by federal law, except in cases where the health of the mother was at risk and was certified to be so by two doctors (Ministério Público 1997). The 1997 law that provided ethical and legal regulation of tubal ligation was motivated by the very high incidence of sterilization, even among very young women, and because most of the surgeries were publicly funded. The new legislation required that a woman already have two children or be at least 25 years of age (*ibid.*). Interestingly, the law has not led to a significant increase in the prevalence of sterilization (Berquó and Cavenaghi 2003). Rather, it has stabilized near the rates in 1997.

The Northeast region of Brazil, the area with the highest fertility rates, has received recent attention with regard to the growing rates of female sterilization (Caetano 2000; Caetano

and Potter 2004). Very little has been reported to date on the dynamics of contraception and female sterilization in the Amazon frontier. This paper focuses on a population in the Lower Amazon to determine how it is similar and different in its contraceptive behavior from other regions and the country as a whole. The Northeast pattern of obtaining sterilization, for example, has been noted to be different from that of the South and Southeast (Caetano and Potter 2004).

In this paper, we discuss the prevalence of female sterilization and other contraceptive methods among rural women of the Lower Amazon. The use of reversible and irreversible contraception methods is analyzed in terms of women's birth cohorts and their individual characteristics (i.e., schooling, religion, occupation, the number of children the women has, the women's age at the time of her first born child, and availability of sources of information about contraceptive methods). We argue that to understand these rural women's contraceptive choices we need to consider the broader social and cultural context, particularly the availability of local health services, the influence of doctors and politicians on women's reproductive choices, and women's own goals for themselves and their children. This paper is a product of a large-scale study that integrates qualitative and quantitative research methods to understand social, demographic, and environmental changes in the Amazon frontier.<sup>3</sup> Data on socioeconomic and demographic household characteristics, women's reproductive life, and contraceptive use were collected in 2003 through structured and semistructured interviews with 525 women over the age of 15 living in the rural areas of the municipality of Santarém, Pará, Brazil.<sup>4</sup> Further, additional informal interviews about women's perceptions of their reproductive lives were carried out in 2003 and 2004. In 2004, doctors and health service agents were also interviewed. To our knowledge, our study is one of only a couple investigating reproductive histories and contraceptive use among rural Amazonian women (Sydenstricker-Neto and Vosti 1993).

## The Study Area and Sampling for this Study

The study area of Santarém is located between the two largest cities of the Brazilian Amazon region (Belém, with about 1.3 million inhabitants, and Manaus with 1.4 million inhabitants) (IBGE 2000). Santarém is the third largest city in the Amazon and the main commercial center of the lower Amazon, in the western part of Pará State (see Figure 1). The municipality has an area of 24,314 sq. km, and the city is located at the confluence of the Amazon and Tapajós Rivers. Until 1997, the Santarém municipality also encompassed the area which is now two new municipalities: Belterra and Placas. Even given this decrease in land area, the population of the municipality of Santarém has increased six-fold since 1940, from 47,559 to 262,538 in the latest census (IBGE 2000). Seventy-one percent of its total population lives in the urban area of the municipality. There is great fluidity between urban and rural areas, with rural people visiting their urban relatives frequently (WinklerPrins 2002:48). Despite being a

regional service town, Santarém presents limited employment opportunities and most of the individuals who migrate to the city are unemployed or underemployed; many individuals and households in town tend to have strong economic and social relationships with households in the rural area, and vice versa (WinklerPrins 2002:47).

As is true in other cities and municipalities of the Amazon region, Santarém has had economic booms and busts based primarily on extraction industries (rubber, logging, gold), agricultural products (grains and jute), and fisheries. As an important regional crossroads, it depends on and is affected by external market demands (Barros and Uhl 1995; Fonseca 1996; Gentil 1988). The region has a history that goes back over 350 years, and has also undergone government-sponsored colonization since 1972, including settlement of thousands of families, like other regions of Amazon (Moran 1981; Schminck and Wood 1992; Smith 1982).

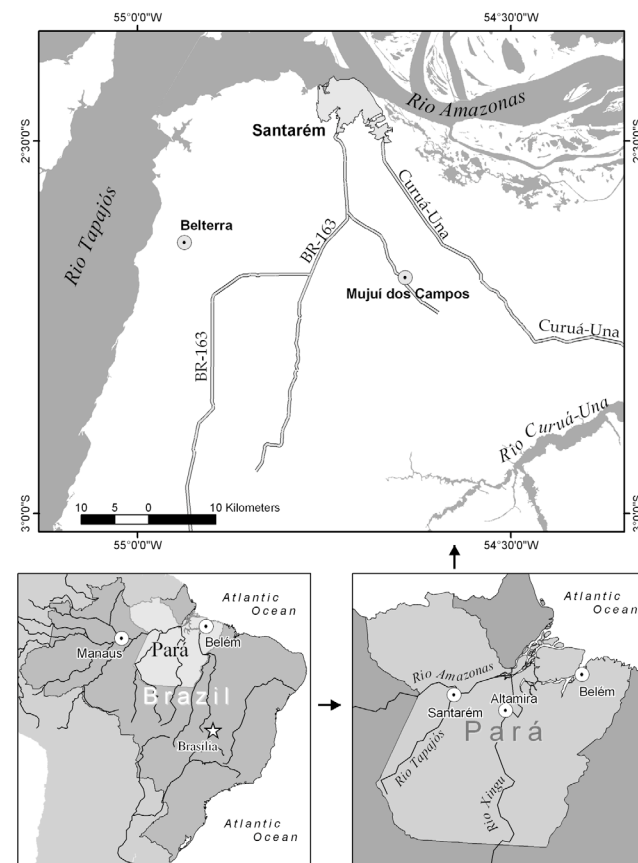
Currently, a new economic phase has begun in the region's rapidly changing landscape. The region has been of interest to large-scale federal programs seeking to expand production of soybeans for export. The program includes the paving of the BR-163 Highway that connects Santarém in the North region to the Center-West (Cuiabá) and the construction of a state-of-the-art river port at Santarém to export soybeans from the Center-West region. The latter is already in place and was financed by the multinational Cargill. The expansion of soybeans is accompanied by new settlers coming largely from the Center-West and Southern part of Brazil, where they were already established as medium to large grain commercial farmers. They come in search of new economic opportunities and with substantial capital for investment, resulting in land consolidation and rapid land use changes in the region (VanWey, D'Antona, and Adams 2006). The small farmers in the region have traditionally relied on a crop portfolio dominated by manioc (*Manihot esculenta*) (Futemma 2000), and some are now selling their properties and migrating to the city or moving to new forested areas.

The larger study, of which this paper is a part, examines the reciprocal relations of population and environment in Amazon. For the Santarém area, we designed our sample to capture the four major streams of migration into the area in the 20<sup>th</sup> century, along roads constructed to settle these various waves (1930s, 1950s, 1960s, and 1970s). We used a multistage cluster sampling approach to account for the reality of the site and to select an appropriate sample for our research, comprising 244 properties and 401 households (see also Moran, Brondizio, and VanWey 2005).

### Characteristics of the Population Studied

The sampled populations are women of small farming families in the municipalities of Santarém and Belterra. Most of them were born and raised in the region, have few years of formal education, are part of the local working poor, and have little or no political representation. They are between the ages of 15 and 78, living in 401 households and on 244

Figure 1. Map of the Study Area

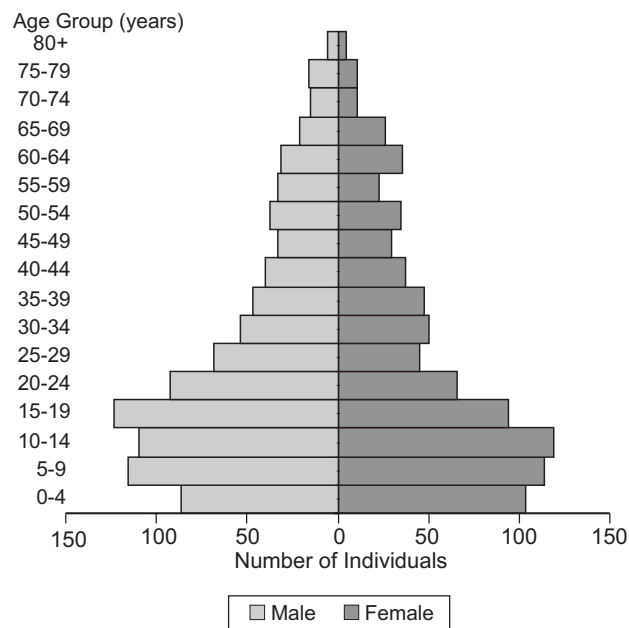


farm lots, in the upland plateau area south of Santarém's urban center. The distance from their farms to the urban center varies from 20 to 76 km. The mean size of the farms occupied by our informants is 36.5 hectares (ha). Thirty-two percent of them were smaller than 10 ha, and seven percent were greater than 100 ha. All farm areas are accessible by dirt or paved road and are served by public bus transportation. A trip to the urban area can take between 30 minutes and two hours in the summer or dry season.

Despite the existence of local health posts throughout the rural areas, the services provided are usually precarious, in both personnel and supplies. At the time of our data collection in the area (2003 and 2004), none provided the women's health and reproductive services mandated by the federal government. Local health posts rarely or unevenly have the pill available, IUDs, or condoms. Services are better in the urban medical posts than rural ones. Because of the lack of physicians at these medical posts, there was little information about the effects that a given type of pill might have on the woman. They provide prenatal care and most deliveries take place in the urban hospitals (in contrast to the rural Northeast of Brazil where a large portion of births are still at home with midwives). However, in Amazon riverine communities not



**Figure 2. Sex and Age Distribution of the Study Population, Santarém, Pará, Brazil**



served by public transportation, the frequency of at home births is probably closer to the Northeast experience.

Most of the farms in our sample are devoted to small-scale agricultural activities and involve most members of the household. Manioc flour and other annual crops, such as rice, beans and corn, are the bulk of food production, and are destined for household consumption and local markets. The number of head of cattle owned—considered a safe, liquid, and lucrative investment in rural Brazil—is a good economic indicator of our study group’s economic stratification. About 37 percent of the households have cattle, and out of these, 49 percent have less than 10 head, followed by 36 percent that have between 10 and 49 head. Only 3 percent had more than 100 head of cattle.

Here, as in other parts of the Brazilian Amazon region (Siqueira et al. 2003), participation in farm activities starts at an early age, regardless of gender. Women work in the fields planting and harvesting, processing manioc flour, tending small animals and home gardens, and provide the bulk of child care and household chores. Their participation in marketing farm products tends to be lower than their male counterparts. Despite their active participation in the household economy, when interviewed, 65.5 percent declared “housework” as their main activity, compared to 19 percent who declared “farming.” Six percent declared business and off-farm work as their main economic activities. Off-farm work included work as elementary school teachers, janitors, and health assistants at local schools or health posts, and domestic work for third parties. Lumped in the category of “business women” are those who sell products door to door, make homemade goods for

local festivities and neighbors, and a few who sell some goods (cooking oil, candles, beer, etc.) from their own houses—a not uncommon way to add to the household cash flow while still taking care of children and other household chores. The remaining women declared themselves as not working any more (6.0 percent) or as students (3.5 percent).

The women in our sample have few years of formal education, as is often the case in isolated rural areas of Brazil and Latin America. Rural schools usually provide the first four years of elementary education. Few rural schools provide the full eight years of elementary education, or secondary education (ninth grade and beyond). For these higher grades, students must find a way to go to the urban center. Nevertheless, levels of educational attainment are higher here than in many areas of the rural Northeast of Brazil. Thirty percent of the women in our sample have one year or less of schooling, 36 percent have between two and four years, 24.4 percent have between five and eight, and only 9 percent had nine or more years. Younger women have more years of schooling. About 77 percent of the interviewed women declared themselves to be Catholic, followed by 20 percent that declared themselves to be part of an Evangelical denomination. There are many kinds of churches in the area, but our survey explored only the larger groupings (Catholic, Spiritist, Evangelical). The Assembly of God church is one of the oldest and mostly commonly found evangelical denominations in the region.

The majority of the women (79 percent) were married (formal or informal) at the time of the interview, 10 percent of women were divorced or widowed, and 11 percent had never married. Women live mostly in nuclear family arrangements (67 percent), although 28 percent live in extended family households, and five percent live by themselves. More households are headed by single mothers (12 percent) than by single fathers (10 percent), and the average household size is 4.6 persons.

The age and sex distribution of the current household members of our study population, about 1,849 individuals, is illustrated in Figure 2. Thirty-six percent of the population is under 15 years of age, and only 6 percent of the total population is over 65. There is slight gender selectivity toward male children between the ages of 15 and 29, reflecting perhaps a farming strategy that retains male labor and loses young women in disproportionate numbers—who often choose to leave the household to study in the city, and then to marry urban men. The declining fertility of the youngest female cohort is evident in the smaller zero to four age group illustrated in Figure 3. The decline in age-specific fertility rates in the last 10 years has brought about this dramatic change.

### Sources of Contraceptive Information

Reported knowledge of contraceptive methods is relatively high in our study group (N = 398 women). Only 13 percent of the women interviewed reported never receiving any kind of information about it. When asked from whom or where they got information on contraceptive methods,

physicians and health center workers were mentioned by about 50 percent of the women, friends and neighbors about 28 percent, family members and media sources (radio and television) were mentioned 12 percent of the time each, school about 10 percent, and church three percent.

Table 1 provides an interesting sense of the changing sources of information in the study group. There is a steady decline from old to young in the percentage of women who never received information on contraception, with 2.35 percent and 1.39 percent for the 1970-79 and 1980-89 cohorts respectively. Younger women have received more information about contraceptives, and are getting more schooling than earlier generations, and this shows in their choices, as we will see later. They are also more willing to talk openly about contraception, in contrast to their mothers, who reported that, in the past, "people didn't talk about these things."

It is interesting to note that physicians and the health care service started to become a significant source of information with the 1940-1949 cohort and have remained steady. Television and radio start to be more important with the 1960-1969 cohort and hold firm with more than 15 percent of subsequent cohorts getting their information from these sources. School is an important source for the two youngest cohorts. Family members as sources of information are also growing in importance with the younger cohorts, while the church is declining. Friends and neighbors have remained steady sources, with about 25 percent of women getting information from them since the 1920-29 cohort.

### Number of Children and Women's Age at First Delivery

Like elsewhere in Brazil, but surprisingly for a frontier area, the number of children per woman is rapidly declining among the study group (Table 2).<sup>5</sup> A drop in the average number of children per woman, from 7.4 to 4.7, is observed

among those women of the 1960-1969 cohort when compared with the previous cohort (1950-1959). Despite the fact that some of the women in the 1960-1969 cohort are still reproductively fit, the number of children they have had up to now is smaller than the women in the previous cohort at the same period of their reproductive ages. A greater drop in the average number of children per women is observed among the two youngest cohorts (1970-1979 and 1980-1989), 3.0 and 1.9 children per woman, respectively. This is consistent, as we saw earlier, with their much greater familiarity with contraception options. They still have years ahead of reproductive lives, but they are having fewer children during the same period of their reproductive lives in comparison to previous cohorts, and women are getting sterilized at earlier ages, as we will discuss later.

In the last three decades, we observe a decrease in the number of children per woman, yet the average age of a woman's first delivery has remained relatively the same—in the early 20s. The women born between the years 1920 and 1929 seem to be an exception to the observed pattern. They have a higher average age (26.1) at the time of the birth of their first child. This could be due purely to the low number of women sampled in this cohort. Figure 3 illustrates the precipitous decline in age-specific female fertility among the women sampled in Santarém, a pattern not unlike found in the rest of Brazil, but, again, surprising for a frontier region (ever since Frederick Jackson Turner's frontier thesis [Turner 1920], it has been understood that labor is the most scarce factor in new frontiers, and that frontier families tend to have relatively large families to ensure a supply of household labor on the farm).

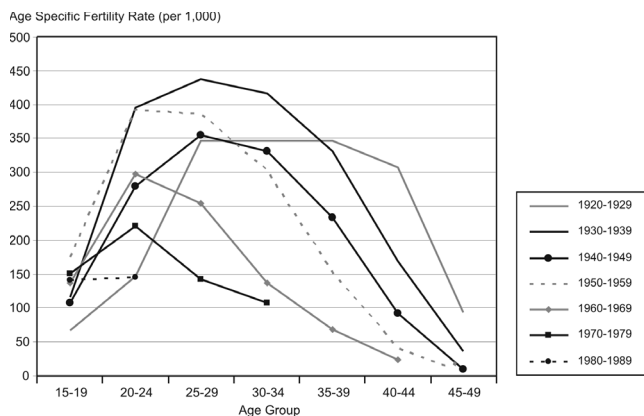
### Women's Alternatives in Choosing Contraceptive Methods

Considering all women in our sample with reported past and current sexual activity (N = 398), current use of reversible

**Table 1. Main Sources of Contraceptive Information. Santarém, Pará, Brazil, 2003 (percent of answers)**

Cohort	Women	Never Received	Received					
			Doctor/ Health Center	Family Member	Friend/ Neighbor	Church	Radio/ Television	School
1910-1919	1	100.00	0.00	0.00	0.00	0.00	0.00	0.00
1920-1929	13	30.77	23.08	15.38	38.46	15.38	0.00	0.00
1930-1939	36	50.00	13.89	0.00	25.00	8.33	8.33	0.00
1940-1949	59	23.73	40.68	8.47	33.90	3.39	1.69	3.39
1950-1959	53	9.43	60.38	3.77	26.42	3.77	0.00	1.89
1960-1969	79	8.86	55.70	12.66	24.05	2.53	17.72	3.80
1970-1979	85	2.35	62.35	14.12	29.41	2.35	24.71	15.29
1980-1989	72	1.39	54.17	26.39	26.39	0.00	15.28	30.56
All Women	398	13.07	50.25	12.56	27.89	3.27	12.56	10.30

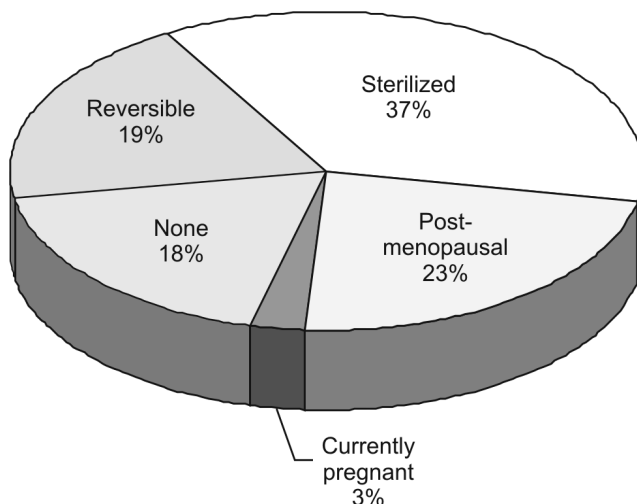
**Figure 3. Age Specific Fertility Rate by Cohort, Women 15 Years Old and More, Santarém, Pará, Brazil, 2003**



methods (19%) falls far behind female sterilization (37%) as a contraceptive choice (Figure 4). Eighteen percent of the interviewed women reported that they were not using any contraceptive method, and more than half of these women had never used any kind of method in their lives. Clearly, the range of options entertained by women in our study is very limited. As noted by other demographers (Berquó and Cavenaghi 2003; Caetano and Potter 2004) this is in part a result of the failure of Brazil's universal health system (*SUS-Sistema Único de Saúde*) to deliver the promised alternatives in contraceptive choice to rural and poor women, at low prices and conveniently available, particularly in areas like Northeast Brazil and Amazon.

For Northeast Brazil, it has been noted that the pattern of obtaining surgical sterilization, with most being separate surgical interventions not associated with Caesarean deliveries, is a result of women delivering at home more frequently, but importantly also a result of the long-standing tradition of

**Figure 4. Use of Contraceptive Methods by Women 15 Years Old or More (N = 398), Santarém, Pará, 2003**



clientilistic politics in the Northeast. Politicians and doctors together have formed an alliance to ensure political support through providing poor women with access to surgical sterilization—which they are all too eager to embrace given the lack of affordable and reliable alternatives offered to them (Caetano and Potter 2004).

The pattern in the Northeast is shaped by its pervasive poverty—with 45 percent of all people considered poor in Brazil living there in 1997. The region also has the highest rates of infant mortality and the lowest levels of educational attainment (Lavinás 1996). In the past, the Northeast (particularly the rural Northeast) had the highest female fertility rates and the rapid decline in fertility in this region starts only in 1980. It went from a total fertility rate (TFR) of 6.1 in 1980 to 3.1 in 1996 (Bem-Estar Familiar no Brasil/Demographic

**Table 2. Women's Number of Children and Average Age at their First Delivery. Santarém, Pará, Brazil, 2003**

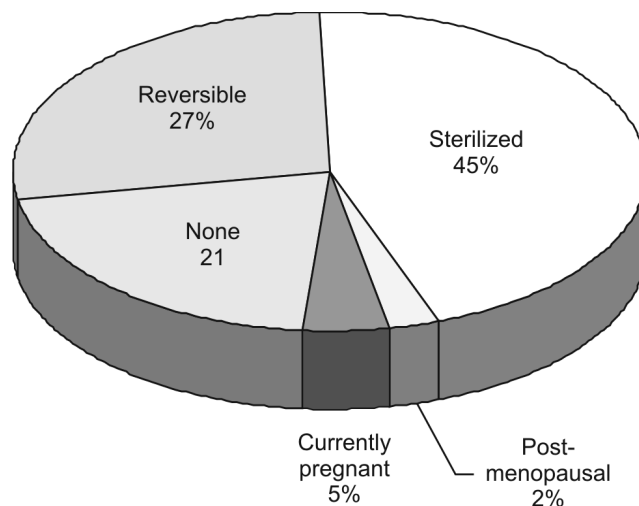
Cohort	Number of Children (#)		Mother's Age at birth of 1 <sup>st</sup> Child (years)					
	Mothers	Average	Standard Deviation	Maximum	Average	Standard Deviation	Minimum	Maximum
1910-1919	1	3.0		3	24.0		24	24
1920-1929	13	9.0	3.5	15	26.1	5.9	17	36
1930-1939	35	9.9	4.0	16	21.5	3.5	15	30
1940-1949	57	7.5	3.9	20	22.5	5.3	12	35
1950-1959	53	7.4	3.1	15	20.1	4.4	14	40
1960-1969	76	4.7	2.9	14	21.2	4.9	13	41
1970-1979	76	3.0	1.6	9	19.8	3.4	12	30

Health Survey [BEMFAM/DHS] 1997); Merrick and Berquó 1983). In this region, poverty, clientilistic politics, lack of family planning services, and a health care system subject to manipulation result in a particular mode of providing surgical sterilizations. Is this the same situation in the Amazon, a region that, like the Northeast, is far from the centers of power and the easier provisioning of health services found in the South and Southeast of Brazil?

Unlike the Northeast, our study region is still a frontier, with plentiful available land, water, and opportunities as compared with much of the rural Northeast. While life is difficult in the frontier, we do not find here the same long-standing patron-client relationships, often labeled *coronelism*, that constrain older areas of the rural Northeast. In fact, many of the settlers who came to the study region in the 1930s and 1950s came from the Northeast (particularly Ceará state), escaping drought and, to some degree, also escaping the constraints of that region's politics. While we see a degree of patron-client relations in this region of Amazon, it is undermined by the constant arrival of new settlers from all over Brazil with ideas on how to advance themselves in this still open system. When comparing national data, or local data, we find that the Amazon and the Santarém region have a population with higher educational attainment than the rural Northeast, with higher income and assets, and that started the fertility transition earlier than the Northeast. While both the Northeast and the Amazon have about the same percentage of women who use the pill (13 percent and 11 percent, respectively), the percent of women who are sterilized as of 1996 is higher in the Amazon, largely because they started earlier. Another reason is that in the Amazon, as in the rest of Brazil, sterilizations are highly coupled with Caesarean delivery, whereas the Northeast has some of the lowest levels of Caesarean delivery because so many women still deliver at home.

The Northeast has the lowest proportion of sterilizations performed during a cesarean (39%) of any other region of Brazil, but the highest rates of any region of interval sterilizations (those performed as a separate and distinct surgical intervention). Of all the surgical sterilizations carried out between 1977 and 1986 in Northeast Brazil, 58 percent were

**Figure 5. Use of Contraceptive Methods by Married Women Between Ages 15 to 49 (N = 217), Santarém, Pará, Brazil, 2003**



not charged to the patient—having been provided largely through clientilistic favor—twice the rate found in the rest of the country. Politicians and physicians (who often are candidates for office themselves in rural areas) are the biggest providers of this service to poor women. Sterilizations increase in frequency during election years—dramatically so in the Northeast, and much less markedly in our study area. Who pays for the sterilization is a good indicator of the presence or absence of clientilistic politics. It is very high in the Northeast of Brazil, very low in the South and Southeast, and only slightly higher than the South in the Amazon. The Amazon and our study region clearly depart from the pattern we find in the Northeast, not in the reliance on surgical sterilization, but on who pays for it, and what the goals are (Table 3).

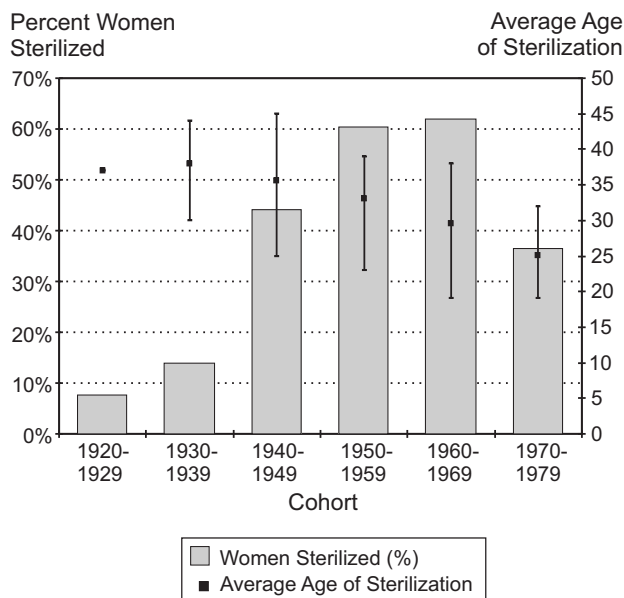
When considering only women in marital unions (whether consensual or civil) of reproductive age, that is between 15

**Table 3. Women's Sterilization: Who Suggested It and Who Paid for It. Santarém, Pará, Brazil, 2003**

Who Suggested It	Sterilized Women		Who Paid			Total
			Interviewee	Politician	SUS-govt.	
Interviewee	49	34.5%	44.9%	0.0%	55.1%	100.0%
Husband & Wife	14	9.9%	50.0%	0.0%	50.0%	100.0%
Husband	7	4.9%	57.1%	0.0%	42.9%	100.0%
Interviewee and Others	4	2.8%	50.0%	25.0%	25.0%	100.0%
Other Family/Friend	13	9.2%	30.8%	7.7%	61.5%	100.0%
Physician	55	38.7%	40.0%	1.8%	58.2%	100.0%
Total	142	100.0%	42.3%	2.1%	55.6%	100.0%



**Figure 6. Percent of Women Sterilized and Average Age of Sterilization, by Cohorts, Santarém, Pará, Brazil, 2003 (N = 145)**



and 49 years old (N = 217), the percentage of women sterilized in our study group (45%) is higher than the national average (40.1%), but lower than the regional one (51.3%) (Figure 5). Current use of reversible methods (27%) is also higher than the national average (20.7%) and much higher than the regional one (11.1%). The pill was reported used by 15 percent of married women, while condoms and the combination of the pill, condoms and other methods were reported for six percent each. As expected, the use of hormonal methods was higher among the youngest cohorts (1970-1979 and 1980-1989) of married women.<sup>6</sup> In our ethnographic interviews, we found that young women up to the age of 20 used the pill. Its use was discontinued to have children in their early 20s, and then they turned to surgical sterilization, rather than the pill or IUD, after they had their two or three children.

Three main reasons were reported for the relatively low use of the pill in our study group. Physical discomfort and health reasons, such as headaches and greater menstrual flow, were mentioned several times as the causes for stopping taking the pill. This is perhaps due to the fact that most of the time the pills they were taking had high hormone doses, which are known to provoke similar reported side effects (Graham 2002; Sanders et al. 2001.) The pill is often taken without a physician's prescription and follow up. Common brands mentioned by women were Nordette and Microvilar, which are higher dosage pills. Women often mentioned weight gain, nausea, and feeling unwell after taking the pill. While it is not uncommon for side effects to occur in the United States among first users of the pill, and doctors often have to change the dosage a few times until finding the right combination

of hormones, the lack of access to doctors (due to cost and inconvenience) leads to reliance on a fool-proof and convenient method to deal with family planning. In our study area we did not hear complaints of postsurgical problems, but note that some research suggests that many women complain of problems after surgical sterilization (Minella 1998). Implicit in the reported health problems were also references to folk perceptions of the pill, such as the idea that pills "weaken" the woman's body (Potter 1999). Women also spoke of the frequency with which they could forget to take the pill, or have it misplaced by other household members. Last, but not least, the pill has to be obtained through purchase in pharmacies in the city, necessitating a trip into town, which further raises the effective cost to the woman. These reasons seem to reinforce the idea that an irreversible solution to unwanted pregnancy is easier and preferable to the reliance on reversible methods that are felt and perceived as both "unhealthy" and costly.

### Women's Sterilization Decision

Thirty-seven percent of women (15 years old or older) were sterilized at the time of the interviews, a number close to the national average for all women in Brazil of reproductive age. The percentage of women sterilized increases as age decreases, from the low percentages in the older cohorts to the highest percentage being observed among the 1950-1959 cohort. About 62 percent of women in this cohort had been sterilized, followed closely by the 1960-1969 cohort with 60 percent. The younger cohorts, 1970-1979 and 1980-1989, currently have lower percentages, but for their age their percentages are running ahead of the earlier cohorts and, as noted earlier, they are better informed about their options. They use the pill when young and sterilize at an earlier age than any previous cohorts (Figure 6).

Women's average age at the time of the sterilization has decreased over time—from about 38 years of age for the 1930-1939 cohort, to the early 30s for the 1950-1959 and 1960-1969 cohorts, respectively (Figure 6). The age continues to drop and may settle in the mid 20s. Since the 1980s surgical sterilization was done mainly for the objective of terminating their reproductive lives, rather than motivated by health problems as had been true for earlier cohorts. In our study population, 85 percent of the women were sterilized during a Caesarean delivery—a higher rate than the national figures for such coupling.

The decision to undertake surgical sterilization in our study population shows the important and determining role of a woman's personal decision, based upon information derived from multiple sources: physicians, family members, school, friends, and the media (Table 1). Forty percent reported that a physician suggested the surgery, but 34 percent declared that it was solely their decision, another 9 percent noted it was a joint husband-wife decision, an additional 6 percent said it was the husband's suggestion, and a further 8 percent came from suggestions by family and friends. This suggests a strong role for women in deciding what they

want to accomplish reproductively and how, given the safe and reliable alternatives available to them.

Because of the tight coupling in our study population between Caesarean delivery and surgical sterilization (85%), we also find a high rate of women who did not have to pay out of pocket for the sterilization. The surgery was covered by the national health service (SUS). Also, in contrast to the Northeast, 43 percent of women in our study paid for the procedure themselves, rather than relying on politicians providing this service. Women paid in whole or in part, as a complement to the SUS reimbursement, for their procedures. Only 3 percent reported having the procedure paid for by politicians. Nevertheless, it is important to remember that despite not paying for the sterilization, politicians may use their influence in expediting and guaranteeing the delivery of public service (in this case, tubal ligation), creating a clientelistic relationship.

The role and influence of physicians and other health care workers over women's reproductive decisions is far from trivial, accounting for nearly half of the decisions. The influence of physicians and health workers is reported elsewhere in Brazil, especially in areas of greater poverty. There, physicians sometimes see it as their social responsibility to assist the poor when they have many children (Goldani n.d.). Implicit in their actions and explicit in their speech (see Caetano and Potter 2004 for interviews in Northeast Brazil) is the fact that they are helping to alleviate poverty by terminating the reproductive lives of women with many children living in poverty. We found similar statements coming from the physicians we interviewed in our study area. In cases when physicians run for political office, the temptation to offer women surgical sterilization is reinforced, since they may see their social responsibility and the potential gain in votes that may result. So far this is much less so in our study area than in traditional rural areas of Northeast Brazil.

### **The Role of Schooling, Religion, and Off-Farm Work**

Beginning with the 1930-1939 cohort, women's years of education correlates with their use of some kind of contraceptive method. Sixty percent of the women with no or only one year of education reported never using any kind of contraceptive method in their lives. Within the older cohorts (up to the 1950-1959 cohort), more years of education correlates with more sterilization. For the 358 women who had children in our sample, more years of formal education are associated with having fewer children. This is also a pattern affected by the age of the women. Younger women tended to have more years of schooling and fewer children. Sterilization follows this impact (i.e., more years of education correlates with more sterilization).

A less clear correlation was observed between use of contraceptive methods and religion. Catholic and Evangelical women had on average the same total number of children. The percentage of women who never used any kind of contraceptive

methods was similar (36% for Catholics and 37% for Evangelicals). On the other hand, female sterilization was 10 percent higher among Evangelicals than among Catholics. Surprisingly, current use of any kind of contraceptive methods was higher among Catholics. They had a similar number of children (5.3 and 5.6, respectively). Therefore, the effect of religion seems very slight, as do churches as sources of information.

Women's reported occupation seems to affect their use of contraceptive methods and their number of children. Women who had off-farm jobs (6.0%) reported the highest use of contraceptive methods and the lowest percentage of never having used contraception. On average, women who worked off-farm had fewer children than other women. The effect of education and off-farm employment is very clear, favoring use of contraception and fewer children.

### **Final Considerations**

The surgical transition that has marked the recent demographic history of Brazil is also taking place among rural women of the lower Amazon. Women are having fewer children and are using sterilization as their main method to prevent unwanted pregnancies. This change in the number of children has been achieved without any change in the age at which women have their first child. In other societies a decline in fertility has been achieved often by postponement of marriage and age at which the first child is conceived. Women's sterilization in our study group is close to the national average, and the use of the pill and other reversible methods is still low, despite reported knowledge about them. The percentage (85%) of coupled Caesarean deliveries with surgical sterilization is higher in this frontier region of the Amazon than the national and regional averages, 55.3 percent and 55.1 percent respectively (IBGE 2000, based on data from DHS). This is clearly tied to the system of reimbursements allowed by the national health system (SUS), and participation of physicians in addressing this social demand from women. Women in this region seem to be exercising greater autonomous decision making than in regions like Northeast Brazil, where they seem to be more at the mercy of political clientelism and interval surgery, requiring a separate surgical procedure. More women in our study area are willing to pay for their sterilizations despite their poverty. However, despite the small numbers of sterilizations reportedly paid or offered by politicians is small among our study group, it is important to remember—as mentioned by Caetano and Potter (2004)—politicians' influence can be wider than reported.

The data show the influence of physicians in women's reproductive decisions. Despite the relatively high knowledge about contraceptive methods among our study group, physicians and health workers are the most frequent source of information, followed by friends and neighbors. Physicians also are mentioned as the main influence for sterilization procedures. Media (television and radio) and school play a growing role in the diffusion of contraceptive information in younger cohorts. From the high percentage of women

deciding by themselves (34%) to be sterilized, one can conclude that we are observing a growing degree of women's empowerment.

Rural women are choosing to leave their rural households to study and to marry urban men, they are choosing to have their children early (21-25), and then terminating their fertility in an irreversible, safe, and economical fashion. This growing autonomy, however, is also a burden, as the majority of the responsibility to avoid conceiving falls to the woman. The latter interpretation seems compelling when taking into account the high percentage of sterilized women and the absence of even a single case of male sterilization in our sample (the number of male sterilizations in the North region of Brazil is so insignificant that they are presented as zero in national statistics—[IBGE 2000]). Given that vasectomies are less complex than tubal ligation, this constitutes an unfair burden on women. However, these rural Amazonian women are not waiting for men to play their part in sharing in this decision. They are taking decisive action, and it is encouraging that some 10 percent of couples are making a joint decision and five percent of sterilizations are suggested by husbands. A couple of decades ago even this level of compliance with this kind of decision by husbands would have been inconceivable.

From a policy perspective, the low use of the pill and other reversible methods by rural women speak of the failure of institutions, such as the Women's Reproductive Health Program (PAISM), which was created by the federal government in the late 1980s with the goal of providing women with basic health services and a range of contraceptive choices. This service is nonexistent for the poor and rural women of our study area. The arm of the state reaches hardly at all into rural regions like those in the Amazon, and Northeast, in the area of public health. It is clearly ineffective, and by continuing not to provide the alternatives to contraception mandated in the 1997 legislation regularizing the provisioning of sterilization the state is compliant in the continued high use of Caesarean deliveries coupled with surgical sterilization.

Last, but not least, our study confirms that women's education matters when it comes to contraceptive choices and use. The higher the number of schooling years, the greater the percentage of women using contraceptive methods—and they choose to have fewer children. Finding these processes in a frontier region, where scarcity of labor is commonly a major constraint, shows how strongly these women feel about having control over their reproduction, even in the face of so many obstacles from the larger society, and from their own partners, who continue to avoid sharing in the burden of making reproductive decisions. Despite all these obstacles, these Amazon frontier women have reduced their fertility in very effective ways, finding information and assistance to do so from sources both public and private.

#### Notes

<sup>1</sup>Along with sterilization, abortion, which is illegal in Brazil except in case of rape and in risky pregnancies, is estimated to have contributed

to about one-third of the declined fertility observed in the country. Its importance is considered to be in the early years of the fertility decline, when access to sterilizations and more efficient contraceptive methods were more restricted (Berquó 1993).

<sup>2</sup>The World Health Organization recommends that only between 10 and 15 percent of total deliveries should be through Caesarean sections.

<sup>3</sup>Amazonian Deforestation and the Structure of Households, phase II. Co-principal investigators: Emilio Moran, Leah VanWey, and Eduardo Brondizio, Indiana University, NIH grant.

<sup>4</sup>These 525 women were living in the 244 sampled properties. The analysis of fertility patterns by age group is presented to all interviewed women (n = 525), while the analysis on contraceptive use this number decreases to 398 women. Excluded from this analysis are those women who declared not having had any current or past sexual activity (n = 69) and those who did not answer the questions (n = 58). It worth noting that most of the informants who reported not having initiated an active sexual life were women younger than 20 years of age and who were living with their parents. Given the local sociocultural context that reprimands sexual activities outside a stable relationship, and the fact that they were interviewed along other family members, several of these young women may be in fact sexually active but were not willing to disclose it publicly.

<sup>5</sup>Three hundred and fifty-eight out of 398 women had at least one child born alive.

<sup>6</sup>The North Region presents the second highest percent of married sterilized women between 15 and 49 years of age in the country, following the Center-West region with 59.5 percent. On the other hand, for this same demographic group, the use of the pill (11%) is the lowest in the country (the national average is 20.7%) and the use of no contraceptive method is the second highest (27.7%), trailing only the Northeast region, 31.8 percent (the national average is 23.3 percent) (IBGE 2000).

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