The Role of Nonclinical Factors in Cesarean Section Rates in Brazil

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Abstract

This study explores the role of nonclinical factors in cesarean section rates in Brazil. Brazil has one of the highest cesarean section rates (37%) in the world. These rates, in turn, are extraordinarily high in private hospitals (over 70%) while in public hospitals they are typically in the 20 to 30 percent range. In analyses using the 1998 Brazilian household survey (PNAD), we find that while education and income level have a very strong positive association with cesarean rates in Brazil, most of that effect disappears in a multivariate model that includes type of hospital. Where a women delivers, then, is the strongest predictor of whether it will be a surgical delivery or not, regardless of her individual characteristics. Policies that attempt to bring down the cesarean rate in Brazil will need to focus less on women's characteristics and more on the structural conditions in which Brazilian women give birth.

****EXTENDED ABSTRACT/PRELIMINARY PAPER****

Introduction

At nearly 40 percent of all births, Brazil has one of the highest cesarean section rates in the world. Private doctors benefit from this "epidemic of cesarean sections in Brazil" (Barros et al. 1991) by being able to schedule cesarean surgeries ahead of time. Doctors can attend more patients and suffer fewer disruptions in their professional and private lives since they do not attend to women going through long labors. Women are said to benefit from the liberal use of cesarean because they avoid the pain of childbirth. Doctors and media reports encourage people to believe that cesareans are risk-free operations for them and their babies, despite substantial contradictory medical evidence. In a system in which private hospitals subject doctors to few regulations and little oversight, entrepreneurial obstetricians can order unnecessary surgical procedures with virtual impunity.

Cesarean section rates are extraordinarily high in private for-profit hospitals, often approaching eighty to ninety percent of all deliveries. Public hospitals, on the other hand, typically have cesarean rates in the twenty to thirty percent range (Hopkins 2000). Though considerably lower in public institutions, these rates are still up to double the fifteen percent level recommended by the World Health Organization. Dramatic regional differences in the cesarean section rates in Brazil highlight an added dimension to problem. For instance over half of all births are delivered by cesarean in the state of São Paulo while the cesarean rate for

most states in the Northeast region are considerably lower, around twenty percent for the region as a whole.

Rates of cesarean section vary by a number of nonclinical factors which include woman's income level, education level, onset of prenatal care, insurance coverage, hospital type and payment status. One would expect that women with less access to health care, those in poorer general health and those with lower incomes and therefore less financial ability to afford quality care would have higher risk pregnancies. This in turn leads one to expect such women to have higher cesarean section rates compared to well-insured, healthier, higher income women. The opposite is true. Cesarean rates are positively associated with income in the United States (Gould, Davey and Stafford 1989; Hurst and Summey 1984) and in Brazil. One Brazilian study found a cesarean section rate of seventeen percent for the lowest income women and a cesarean rate of fifty-eight percent for women with the highest incomes (Faúndes and Cecatti 1993).

Janowitz et al. (1985) found a positive association between education and cesarean rates in Brazil. More recently, de Moraes and Goldenberg (2001) found a similarly strong association for the state of Sao Paulo. This study explores the relative relationship of women's characteristics (e.g., education, income, age, parity) and that of the structural variable of type of hospital.

Health Care Delivery in Brazil

Public and private health care delivery systems operate simultaneously in Brazil. The public system, known as the Unified Health System (*Sistema Unificado de Saúde,* or SUS), was established in 1988 and receives financing directly from federal and local governments. The private system is organized in a variety of ways. Some operate like U.S. health maintenance organizations. Others operate like preferred provider organizations, and some provide services directly to their employees on site or contract from the other organizations to provide health care to their employees (Medici et al. 1997). Private for-profit health insurance companies, either contracted by the health care consumers on an individual basis or provided by the employer, pay for the majority of medical services in the private for-profit hospitals that do not accept SUS patients. However, private "affiliated" hospitals that do accept SUS patients make up the bulk of health care delivery in Brazil. In 1987 the social security health insurance system, INAMPS (the precursor to SUS), paid for sixty-four percent of all hospitals stays, though less

than twenty percent of these stays were in public hospitals. In addition, while just half of outpatient care took place in public facilities, INAMPS financed over seventy percent of it. "The private role in provision is clear from these statistics, but what is equally evident is that the government is the major payer of services, especially for hospital care..." (Lewis and Medici n.d.: 16). Direct out-of-pocket payments is a third type of health care delivery scheme in Brazil but is rarely used and then only by the high income population (Medici et al. 1997).

Methods

The data for this paper come from the 1998 Brazilian household survey known as the *Pesquisa Nacional da Amostra Domiciliar*, or PNAD, from which we extracted the 484 records of women who had a birth in the previous year. The main outcome variable was whether the delivery was by cesarean or vaginally. Our independent variables are education (years of schooling), income (measured in monthly minimum wages); age, parity, region and type of hospital in which the delivery took place.

We ran logistic regression models to predict the odds of delivering by cesarean. We included an interaction term between education and income in all our models but found it to be insignificant so the results we present below do not include the interaction term.

Results

Table 1 presents cesarean rates for the sample of women who gave birth in previous year, according to individual and structural variables. We found a strong positive monotonic relationship between years of schooling and the cesarean rate (CS): women with no schooling had a CS rate of 22 percent while those who had at least completed secondary school had a 79 percent CS rate. Similarly, we found a strong positive and association between level of income and the CS rate. Twenty-nine percent of women in the lowest income bracket (none to half a minimum wage) had given birth surgically compared to 72 percent of women in highest income bracket (ten or more minimum wages per month). Higher proportions of older women, those having their second child and women living in the Central West region of Brazil delivered by cesarean, compared to other categories of those characteristics. Finally, we found a strong bivariate relationship between type of hospital and cesarean rates. Women who delivered in public SUS hospitals had the lowest CS rate (30%) followed by women who delivered in private

hospitals and whose births were paid by SUS (41%), followed by non-SUS public hospitals (52%). The highest CS rate, 75%, was found for private non-SUS hospital sample.

In Table 2 we present the results of a series of logistic regression models that predict cesarean section rates for the Brazilian sample. Models 1 and 2 predict the odds that a woman will deliver by cesarean according to her years of schooling and income, respectively. Compared to women who have five to eight years of schooling, women with no schooling are less than half as likely to deliver by cesarean. Women with completed high school or more, on the other hand, are 5.7 times as likely to have a cesarean. Similarly, compared to women in the middle of the income range, women in the lowest category are about 22 percent as likely to have a CS while women in the highest category are over five times as likely to deliver surgically. In Model 3, we regressed education and income on the odds of delivering by cesarean and found that the effect of one variable blunted the other. In other words, the odds of delivering by CS increased for women in the categories below the reference categories and decreased for the categories above it. As in Models 1 and 2, all coefficients were statistically significant, with the exception of one to four years of schooling and the two to three minimum wage income category.

In Model 4 we include type of hospital and found that the while there is still a positive relationship the odds of delivering by cesarean and years of schooling and income level, the odds are substantially reduced. Women who delivered in private non-SUS hospitals were over three and a half times more likely to deliver by cesarean, even after controlling for woman's years of education and income level.

In the final model, we include age, parity and region to the previous model and find that the education effect is further reduced and is now only significant for the lowest and highest education categories. The odds ratios for income, meanwhile, are now only statistically significant for the two lowest income categories. The odds ratios for type of hospital, on the other hand, are only slighly reduced compared to the previous model and all are statistically significant. In addition, women in the two older age categories are more likely to deliver by CS; women with high parity (three or more) are about 40% as likely as those delivering their second child; and Northeastern women are the least likely to deliver surgically, compared to those in the Southeast.

Figures 1 and 2 present these results graphically. Regressing income and education together not surprisingly reduces the effect of both. With the inclusion of income in the model, the odds that a woman with twelve or more years of schooling will deliver by cesarean is reduced by 45 percent. With the introduction of income and type of hospital, the main effect is reduced by 59 percent and by 66 percent in the full model. For level of income, we can see that the main effect for someone in the highest income category is reduced by 45 percent with the introduction of years of schooling and by 73 percent with the introduction of education and type of hospital where the woman delivered.

Discussion

Not surprisingly, introducing income and education into the same model to predict the odds that a Brazilian woman will deliver by cesarean section reduced the main effects seen in the bivariate model. With the introduction of type of hospital, however, the main effect is reduced even more, particularly for income. In other words, this suggests that rich, well-educated women deliver by cesarean not so much because of their individual characteristics but because of where they deliver their babies. Unfortunately, we could we did not have a measure of sterilization, which we know to have a strong impact on the cesarean rate, especially in the private sector (Potter et al. 2003)

What can explain this strong effect of where a woman delivers her baby on whether it will be surgical or not? Faúndes and Cecatti (1991, 1993) and others (Potter et al. 1991; Hopkins 2000) contend that economic incentives for doctors play a role in the high rate of cesarean section in private hospitals. Until 1980 obstetricians were paid more for cesarean deliveries than for vaginal deliveries, and although payment schemes have since been equalized, surgical delivery still tends to be far more remunerative per hour worked in the delivery room (e.g., a scheduled cesarean takes one hour from start to finish). Cesarean section deliveries also allow physicians greater scheduling freedom and do not conflict with their normal office hours.

This last point is particularly important given the organization of obstetric delivery services in Brazil. Private obstetricians typically do not work in teams but instead attend the deliveries of all their private clientele. If a woman enters into labor during working hours, the doctor typically has to cancel all his appointments in order to attend her labor. Since many doctors work multiple jobs in multiple sites, a call to attend labor can be additionally problematic. If, for example, an obstetrician works two twelve-hour shifts per week at a public

hospital and two six-hour morning shifts at a public health clinic in addition to seeing her private patients in the afternoons, she has strong incentives to schedule cesarean deliveries. Scheduling cesarean deliveries minimizes professional and personal life disruptions and maximizes an obstetrician's number of private patients.

In contrast, when an obstetrician works a shift at a public hospital, he or she is required to stay in the obstetrics ward to attend any patient that happens to be there. It makes little difference if the doctor attends five vaginal deliveries or five cesarean deliveries because she must only complete her shift. In fact, some hospitals expect medical support staff such as medical students, obstetrical residents, or nurse-midwives to evaluate patients during the evolution of labor. Staff obstetricians are only called in to consult on more complicated cases. Furthermore, staff doctors often do not attend vaginal deliveries (the medical support staff does so) but they do attend cesarean deliveries. These institutional arrangements in public hospitals favor vaginal delivery.

The policy implications of this study point to the need to target interventions toward doctors who attend deliveries in private hospitals and toward health insurance companies that reimburse doctors for those deliveries. The introduction of group practices could relieve some of the time pressures obstetricians face while the introduction of a cap on the proportion of cesarean deliveries health insurance companies will reimburse for any one doctor could provide a strong disincentive to perform unnecessary cesareans that women do not want.

Tables and Figures

Table 1. CESAREAN SECTION RATES BY INDIVIDUAL AND STRUCTURAL VARIABLES, BRAZIL, 1998

Independent variables	Cesarean section n	%	Chi-Square	P
Years of Schooling				
0	75	21.7	332.3	< 0.0001
1-4	434	33.6		
5-8	630	38.2		
9-11	533	54.3		
12+	234	78.8		
Income (minimum wages)				
0.0 to 0.49	186	28.6	372.2	< 0.0001
0.5 to 0.99	132	25.1		
1.0 to 1.99	334	33.5		
2.0 to 2.99	242	39.9		
3.0 to 4.99	353	46.6		
5.0 to 9.99	357	58.6		
10+	302	72.1		
Age				
10-24	746	33.7	115.6	< 0.0001
25-34	905	49.1		
35-39	255	50.5		
Parity				
1 child	825	43.7	49.1	< 0.0001
2 children	633	46.6		
3 and more children	448	34.0		
Payment[a]/Type of hospital				
SUS/public	898	30.3	598.0	< 0.0001
SUS/private	172	41.4		
Non-SUS/public	111	51.9		
Non-SUS/private	725	74.5		
Region				
North	117	40.5	130.6	< 0.0001
Northeast	457	30.6		
South	677	48.4		
Southeast	377	43.8		
Central-West	278	53.0		

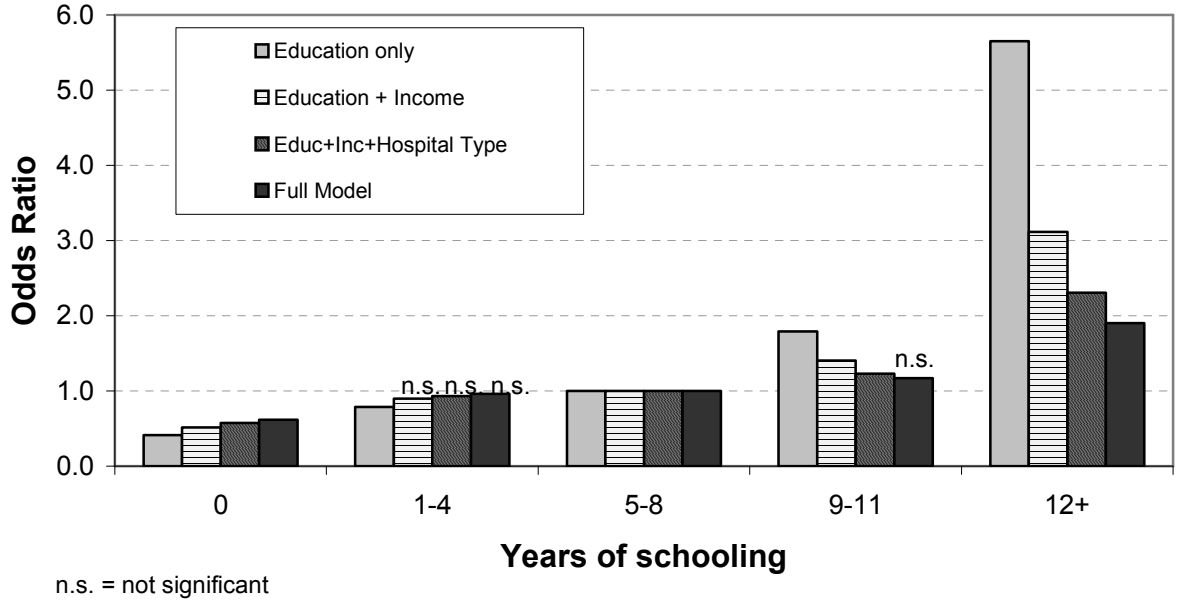
[a] SUS is the publicly funded health system (Sistema Único de Saúde)
Source: 1998 Brazilian Household Sample (PNAD).

Table 2. ODDS RATIOS FOR WOMEN WHO DELIVERED BY CESAREAN SECTION FOR A SET OF REGRESSION MODELS, BRAZIL, 1998

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
Years of Schooling					
0	0.413****	–	0.514****	0.575****	0.617***
1-4	0.787***	–	0.897	0.932	0.963
5-8	**1.000**	–	**1.000**	**1.000**	**1.000**
9-11	1.791****	–	1.404****	1.228*	1.172
12+	5.650****	–	3.115****	2.308****	1.901***
Income (minimum wages)					
0.0 to 0.49	–	0.778*	0.739**	0.723**	0.767*
0.5 to 0.99	–	0.642***	0.675**	0.715**	0.779*
1.0 to 1.99	–	**1.000**	**1.000**	**1.000**	**1.000**
2.0 to 2.99	–	1.299*	1.212	1.165	1.079
3.0 to 4.99	–	1.848****	1.607****	1.343**	1.173
5.0 to 9.99	–	2.733****	2.096****	1.418**	1.190
10+	–	5.207****	2.752****	1.417*	1.251
Age					
10-24	–	–	–	–	**1.000**
25-34	–	–	–	–	1.693****
35-39	–	–	–	–	1.868****
Parity					
1	–	–	–	–	0.936
2	–	–	–	–	**1.000**
3+	–	–	–	–	0.620****
Payment[a]/Type of hospital					
SUS/public	–	–	–	**1.000**	**1.000**
SUS/private	–	–	–	1.469***	1.378**
Non-SUS/public	–	–	–	1.727****	1.717***
Non-SUS/private	–	–	–	3.730****	3.439****
Region					
North	–	–	–	–	0.878
Northeast	–	–	–	–	0.661****
South	–	–	–	–	0.802*
Southeast	–	–	–	–	**1.000**
Central-West	–	–	–	–	1.314*

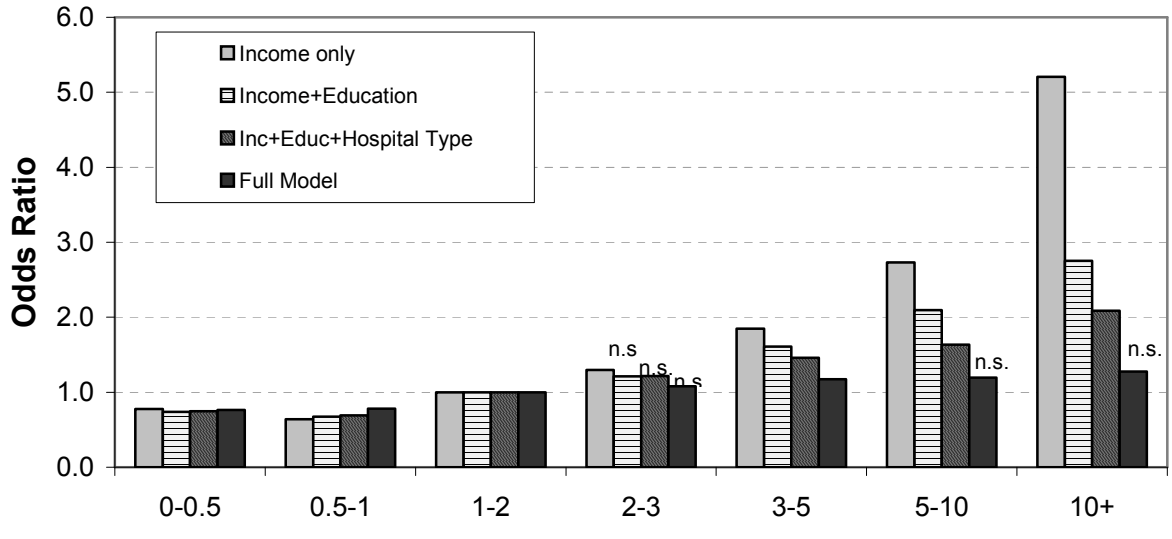
[a] SUS is the publicly funded health system (Sistema Único de Saúde).
Source: 1998 Brazilian Household Sample (PNAD).
* Significant at p<.05.
** Significant at p<.01.
*** Significant at p<.001.
**** Significant at p<.0001.

Figure 1. Odds ratios for cesarean section by years of schooling - Brazil, 1998



n.s. = not significant

Figure 2. Odds ratios for cesarean section by income Brazil, 1998



n.s. = not significant

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