

Adolescent Fertility Behavior: Trends And Determinants in Northeastern Brazil

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Context: Much of the recent decline in Brazil's total fertility rate has been observed among women in the middle of their reproductive years. In contrast, the contribution of adolescent fertility (among 15–19-year-olds) to the total fertility rate is increasing over time. This trend is particularly accentuated in the country's Northeast region.

Methods: Data from three Demographic and Health Surveys conducted in Northeastern Brazil in 1986, 1991 and 1996 are used to examine trends and determinants of fertility behavior among adolescents in the region. Discrete-time hazard models are used to estimate the probability of a woman having a first birth during adolescence, and to evaluate individual and environmental factors that may influence personal fertility choices.

Results: A young woman's level of education is the factor most strongly and consistently associated with the probability of giving birth during adolescence. In particular, an adolescent with no more than primary schooling is more than twice as likely to have had a first birth than an adolescent with at least a secondary education, even after the analysis is controlled for age, time period and other characteristics. Religious affiliation and mass media exposure did not consistently affect adolescent fertility over time in the multivariate analysis.

Conclusions: The promotion of education may be the most effective means of encouraging delayed childbearing among adolescents in Northeastern Brazil. There is a need for greater research into the impact of community facilities on teenage fertility, notably health and family planning programs, that target adolescents.

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Brazil has experienced rapid fertility decline over the last few decades, despite the lack of formal government support for family planning. The national total fertility rate (TFR) dropped from 5.8 to 2.5 lifetime births per woman between 1970 and 1996. While the pace of the fertility decline accelerated between 1978 and 1985, most of the decrease was observed among women in the middle of their reproductive years. Consequently, the proportional contribution of adolescent fertility (among women aged 15–19) to the overall fertility rate (among women aged 15–44) has been increasing over time.¹ According to estimates from the Brazil Demographic and Health Survey (DHS), the percentage of all births among adolescents

increased from 12% to nearly 19% between 1986 and 1996, while the rate among women aged 25–39 dropped from 53% to 48% during the same period.

A lag in the decline of adolescent fertility compared to the decline in the TFR has been generally observed throughout Latin America. Previous research has suggested that adolescents in this region have taken less advantage of family planning services than older women.² The 1996 Brazil DHS reveals that 18% of female adolescents have been pregnant at least once. In the Northeast, an area of high fertility with a TFR of 3.1 lifetime births per woman, some 21% of adolescent girls have already become pregnant, despite near universal knowledge of contraceptive methods.

Adolescent fertility has steadily risen in the Northeast region over the past 10 years, both in absolute terms (17% of adolescents had ever given birth in 1996, up from 12% in 1986) and in relative contribution to the TFR (20% of all births were to teenagers in the year preceding the 1996 survey, compared with 12% 10 years earlier). The incidence of premarital childbearing among adolescents has also increased: The percentage of all first-born infants that belong to a single adolescent mother rose from 5%

to 11% over the same 10-year period.

The consequences of teenage fertility are well documented and raise fundamental concerns about the health and social development of young mothers and their children. Teenage pregnancy is generally associated with higher rates of maternal morbidity and mortality and greater risks for clandestine abortion, delivery complications and low-birth-weight infants. Young mothers who leave school early may also lose important educational opportunities.³

In this article, we examine trends and determinants of adolescent fertility behavior in Northeastern Brazil. Using data from three successive Demographic and Health Surveys conducted in 1986, 1991 and 1996, we present a descriptive analysis of the key characteristics of individuals and their environment that are believed to influence personal choice in fertility regulation. We then use discrete-time hazard models in a multilevel form to estimate the probability of an adolescent ever giving birth, given the socioeconomic and cultural context of the Northeast.

Background

Fertility Transition in Brazil

Rates of fertility remained relatively high and stable in Brazil throughout the first half of this century. Then, around the late 1960s, the TFR began to decline sharply. This abrupt change was observed among all social groups and in all sectors, both urban and rural, despite the absence of government policies to facilitate family planning. However, the pace and timing of the fertility decline differed among groups, and large regional variations persist. According to 1996 DHS data, the TFR ranges from a low of 2.1 lifetime births per woman in the state of Rio de Janeiro to a high of 3.1 per woman in the Northeast.* Ideal family size fluctuates less across regions, however (between 2.1 and 2.7 births per woman), and in the Northeast, reflects the national average of 2.3 births per woman.⁴

The 45.5 million inhabitants of Northeastern Brazil represent 29% of the country's population, and 46% of all rural res-

*The states of Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia.

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Table 1. Percentage distribution of adolescent women aged 15–19, by measure of reproductive behavior and socioeconomic characteristics, according to region and year of survey, Brazil

Characteristic	Northeast			Southeast	
	1986 (N=382)	1991 (N=1,395)	1996 (N=752)	1986 (N=582)	1996 (N=1,036)
Age					
15–16	44.2	44.2	44.4	38.9	43.8
17–19	55.8	55.8	55.6	61.1	56.2
Education					
0–4	47.1	47.7	41.9	27.5	14.7
≥5	52.9	52.3	58.1	72.5	85.3
Place of residence					
Urban	62.4	64.4	69.4	81.6	88.5
Rural	37.6	35.6	30.4	18.4	11.5
Religion					
Catholic	83.6	80.0	82.7	75.1	74.7
Other/none	16.4	20.0	17.2	24.9	25.4
Race†					
White	u	20.7	24.2	u	48.2
Nonwhite	u	79.5	75.7	u	51.9
Watches TV weekly					
Yes	67.6	80.0	84.7	85.9	94.4
No	32.4	20.0	15.3	14.1	5.6
Ever gave birth					
Yes	12.3	11.0	16.6	8.8	12.3
No	87.7	89.0	83.1	91.2	87.7
Ever had intercourse					
Yes	19.9	22.4	30.4	16.1	32.0
No	80.1	77.6	69.6	83.9	68.1
Ever used contraceptives					
Yes	11.1	13.4	21.8	11.7	28.7
No	88.9	86.6	78.2	88.3	71.3
Ever in union					
Yes	14.9	16.9	19.0	11.9	14.6
No	85.1	83.1	81.0	88.1	85.4
Total	100.0	100.0	100.0	100.0	100.0

†Race variable was not included in the 1986 Brazil DHS questionnaire. Note: Data shown relate to characteristics reported at the time of survey and are weighted to reflect sampling procedures. u=unavailable.

idents. This is one of Brazil's poorest regions, exhibiting some of the lowest socioeconomic indicators: The infant mortality rate is nearly twice the national average (74 infant deaths per 1,000 live births, compared with 39 per 1,000 nationally).⁵ While the region is still marked by the highest TFR in the country, it has undergone the fastest relative fertility reduction over the past decade,⁶ from 5.2 lifetime births per woman in 1986 to 3.1 per woman in 1996, a 40% drop. The distinct ethnic makeup of the Northeast includes a greater nonwhite population than the national average (74% vs. 56%). Thus, an analysis of adolescent fertility must be

*The states of Rio de Janeiro, São Paulo, Minas Gerais and Espírito Santo.

†Oral contraceptives, the IUD, the injectable, the implant, vaginal methods (foam, jelly or diaphragm), condoms and male or female sterilization.

placed within this wider socioeconomic and cultural context.

Adolescent Fertility

Adolescents generally display lower fertility rates than women in the middle of their reproductive years. This reflects the evolution of a woman's reproductive life cycle, with lower fecundity at the onset of the reproductive period and a lower risk of conception, given less-frequent sexual activity. However, in Northeastern Brazil, older women appear to take better advantage of family planning services than young women, with the result that the contribution of adolescent fertility to the TFR is increasing.

A portrait of the evolution in reproductive behavior among our target population is presented in Table 1. There have been continuous increases from 1986 to 1996 in the proportion of adolescents who have ever engaged in sexual activity and who have ever used contraceptives. The percentages of adolescents who marry also increased, but

at a slower pace, suggesting that marriage is not the dominant proximate determinant regulating teenage fertility.

Teenage fertility is greater both in absolute terms and in relative contribution in the Northeast than in the more highly developed Southeast region,* where contraceptive use is more widespread: Nearly 17% of female adolescents have already given birth in the Northeast, compared with 12% in the Southeast. Meanwhile, the adolescent contribution to overall fertility rose in each region over the prior decade, from 12% to 20% of all births in the year preceding the 1986 and 1996 DHS in the Northeast, and from 9% to 12% of all births in the Southeast (not shown).

Family Planning Practices

In Brazil, 94% of women of reproductive age living in union in 1996 used some method of family planning, and the vast majority of

these women were using a modern contraceptive.[†] Evidence from the DHS suggests that contraceptive usage is widespread among adolescents, with 72% of sexually experienced adolescent girls reporting in 1996 that they had ever used contraceptives, a striking increase from the rate 10 years earlier (55%) among this age-group.

Among sexually experienced women aged 25–44, the most commonly used contraceptive methods are female sterilization (41%) and the pill (19%). Among sexually experienced adolescents, the pill is the most prevalent method (27%), followed by the condom (10%). In the Northeast, the overall trends are similar, although the actual rates are lower (18% for the pill and 8% for the condom).

Despite these relatively high levels of contraceptive use, an unmet demand for family planning services seems to persist. Data from the 1996 DHS suggest that up to half of all births across the country are unplanned. In the Northeast, 51% of adolescents reported their last birth was unplanned. This marks a considerable increase from 40% in 1986, although birth spacing seems to be a greater issue among teenagers than family-size limitation.

While abortion is illegal except in cases of rape or when the pregnancy endangers the life of a pregnant woman, its practice is believed to be widespread, especially among young and low-income women. (Statistics are scarce and unreliable, however.) The Brazilian government has traditionally resisted developing formal population control policies, and has yet to implement a national family planning program. In recent years, though, certain family planning-related services have been incorporated into the country's maternal and child health program. In 1996, more than two-thirds of adolescents in the Northeast who were practicing contraception still relied on the private sector as their main source of family planning services.

Fertility Determinants

Which factors are most responsible for differentials in reproductive outcomes among adolescents? Aside from age distribution (which, as seen in Table 1, has not changed significantly in Northeastern Brazil over the decade), several explanatory variables have been identified in the literature and may be broadly classified according to either their socioeconomic or cultural nature. One of the most consistent findings of analyses of fertility behavior in developing countries, including Brazil, is a strong correlation between the level of women's education and fertility regu-

lation.⁷ Schooling of women is often viewed as an indicator of socioeconomic development, and the variable is also negatively correlated with infant mortality, thus reducing overall demand for children. One longitudinal analysis of fertility patterns in Brazil identified education as a critical catalyst in the country's fertility transition.⁸ In the Northeast, education has also been observed to be one of the most important fertility determinants among adult women.⁹

Among adolescents, while higher levels of education are associated with a lower probability of giving birth, the direction of causality is less clear. Adolescent girls may delay childbearing in order to complete their formal education, but teenage mothers may also be forced to leave school early upon having a child. In order to reduce the biases of selectivity, in our analysis we limited our educational categories to those with only primary schooling (0–4 years) and those who have at least some secondary schooling (five or more years). The proportion of female adolescents in the Northeast who had received at least some secondary schooling at the time of the survey has been rising, from 53% in 1986 to 58% 10 years later (Table 1). Nevertheless, compared with their counterparts in the Southeast, educational levels remain significantly lower in Northeastern Brazil, both in absolute terms and in the rate of increase.

Another socioeconomic variable that emerges from the literature as an important influence on fertility behavior is place of residence. Fertility levels are expected to be lower in urban areas than in rural areas. This holds true for Brazil generally, where the TFR is 2.3 births per woman in urban areas and 3.5 per woman in rural areas. The Northeast is becoming increasingly urbanized, with the proportion of young women living in urban areas up seven percentage points between 1986 and 1996. This figure is similar to those observed in the Southeast, albeit at a lower absolute level.

On the other hand, differential patterns in reproductive behavior that are not readily explained by socioeconomic variables can often be attributed to the influence of cultural or ideational differences.¹⁰ In Brazil, the mass media are believed to play a significant role in promoting social change with respect to attitudes about fertility and reproductive behaviors, especially given the country's linguistic homogeneity. Family planning is almost universally known, and is no longer a taboo topic in the mass media.

In a recent analysis of DHS data, access to the media was found to be the most important predictor of fertility among younger adult women (those aged 20–30 years) in the Northeast.¹¹ Among adolescent females, contraceptive knowledge reaches 99%, and 100% of sexually experienced teenagers are aware of at least one modern method. While there is no evidence of explicit messages that encourage women to limit childbearing, television programs, particularly Brazilian soap operas (*telenovelas*), disseminate images that might be interpreted to be supportive of lower fertility.¹² In Northeastern Brazil, nearly 85% of teenage girls watched television on a weekly basis in 1996, up 17 percentage points from 10 years earlier. The number of adolescent girls watching television weekly is even higher in the Southeast (94%).

Differences in fertility levels according to race and religious affiliation have been observed throughout the world. In particular, historical studies in North America suggested that Catholics have experienced relatively high fertility rates.¹³ Brazilian society is predominantly Catholic, and more than 80% of young women in the Northeast are Catholic, compared to only 75% of female adolescents in the Southeast. However, the importance of the impact of religion on fertility outcomes in this group is uncertain. Previous research has also suggested that the Roman Catholic Church may have more influence on the Brazilian government's family planning policies in relation to limiting service availability than it does in terms of discouraging fertility-limiting behavior among its followers.¹⁴

Finally, the nonwhite population is larger in the Northeast than in the rest of the country: Some three-quarters of adolescents in the Northeast are nonwhite, compared with just over half in the Southeast. There is substantial socioeconomic inequality between races in Brazil,¹⁵ and race may be an important factor associated with access to reproductive health care for adolescents.¹⁶ Our goal is to examine whether fertility differentials by race persist after socioeconomic factors and other characteristics are taken into account.

Data and Methods

Data Sources

The 1986 Pesquisa Nacional sobre Saúde Materno-Infantil e Planejamento Familiar provided researchers with Brazil's first compilation of data on fertility and its major documented determinants.¹⁷ For this nationally representative data set, interviews were conducted with 5,892 women aged 15–44. Among these, 1,792

resided in the Northeast—788 of them aged 15–24. (The results of this survey indicated a need for more investigation into ways of evaluating and improving the quality of family planning services, and also seemed to suggest that priority status should be granted to the Northeast.¹⁸)

The Pesquisa sobre Saúde Familiar no Nordeste Brasil was conducted in the Northeast region alone in 1991.¹⁹ A total of 5,695 women of childbearing age were interviewed, including 2,550 women aged 15–24.* Finally, the Pesquisa Nacional Sobre Demografia e Saúde, conducted in 1996, provides the most recent information on fertility and family planning across Brazil, and particularly for the Northeast.²⁰ This survey included 1,861 women aged 15–24 who were living in the Northeast.

Methodology

In this article, we draw on multilevel discrete time-hazard models to analyze trends and determinants of adolescent reproductive outcomes, using data from the three successive DHS surveys. Thanks to questionnaire similarities, individual-level results are generally comparable, bolstering time-trend analyses within a given age-group. We focus on young women aged 15–19 at the time of each survey. We also draw on the experiences of women aged 20–24 in each survey, to examine those who have recently completed their adolescence.

Furthermore, the surveys' two-stage cluster sampling techniques, based on random subsamples of households and districts from the national statistics bureau, allow us to evaluate the independent random effects of community influences. Many previous statistical analyses have assumed that individual observations are independent. However, for samples selected in two stages, such as the DHS, there tends to be a certain correlation between observations within clusters: Individuals from the same cluster are expected to be more alike in terms of characteristics and behaviors than those selected from different clusters. As a result, the standard errors may have been underestimated. We thus employ multilevel analysis, considered more appropriate for this type of hierarchically clustered sampling.

Discrete-time hazard models (in multilevel form) estimate the probability of an adolescent having a first birth. This approach allows considerable flexibility in han-

*The 1991 and 1996 surveys included women aged 15–49. To maintain comparability with the 1986 survey, the last five-year group has been excluded from this analysis.

dling time-varying covariates (in particular, a woman's age).²¹ Another advantage of discrete-time hazard models is that they allow us to fit censored observations (that is, women aged 15–19 who had not yet completed adolescence at the time of the survey), as well as women aged 20–24 years.

The model is essentially a logistic regression, with the dependent variable being the log odds of a woman having had a first birth at age t ($t=15, 16, 17, 18$ or 19).^{*} As such, we have created a variable that indicates with repeated measures whether a first birth occurred at each given age of exposure. Once the event occurs, the woman is removed from the model. For example, a woman aged 20 at the time of the survey who first gave birth when she was 17 contributes to three observations: two indicating that she did not give birth at either age 15 or 16, and one indicating that the event occurred at age 17. If the observation is censored (for example, the case of an adolescent currently aged 17 who has never given birth), she contributes to two observations, indicating the event did not occur at age 15 or 16.

We then estimate the effect of a specific covariate while controlling for a series of other factors that are assumed to influence the response variable.[†]

We have included a number of demographic and cultural variables in our model that are likely to influence adolescent fertility behavior: age, place of residence, education, religion, mass media exposure and, where available, race. We estimated para-

*The few births to even younger mothers were counted as having occurred to 15-year-olds.

†Our multivariate model may be written as: $\log(h_{tj}/(1-h_{tj})) = \alpha_t + x'_{ij}\beta + u_{ij}$ with $h_{tj} = P(y_{tj}=1 | y_{kij}=0, k < t)$. We can define y_{tj} to be the binary response at age t ($t=15-19$, in completed years) of woman i having a first birth in cluster j , where y_{tj} is equal to one if the woman has her first child at age t , and is equal to zero otherwise. We can thus let h_{tj} be the conditional probability that y_{tj} is equal to one (given that it did not equal one at any previous time). In standard notation, α_t is a function of age (a time-varying variable), x_{ij} the covariates vector and β its corresponding parameters vector. The remaining term in the equation, u_{ij} , expresses the variation across clusters (itself independent of the baseline hazard across individuals).

‡The expected cumulative probability of a woman i in a cluster j having a first birth at age t can be estimated as follows: $h_{tj} = \exp(\alpha_t + x'_{ij}\beta + u_{ij}) / (1 + \exp(\alpha_t + x'_{ij}\beta + u_{ij}))$. The cluster-level random parameter is assumed to be normally distributed, with mean zero and variance σ^2 . Based on these results, we can estimate the probability that the event does not occur before time t . This probability is represented by: $\hat{S}_{tj} = \prod_{k=1}^{t-1} (1 - h_{kj})$. We can now calculate the cumulative probability that the event occurs, defined as follows: $\hat{F}_{tj} = 1 - \hat{S}_{tj}$. In order to calculate the effect of a specific covariate on the cumulative probability, the others are held at their mean.

meters using the software package MLn, which allows four different procedures for nonlinear multilevel modeling.²² Our analysis uses the second-order predictive quasi-likelihood (PQL) procedure, which produces more reliable estimates for this type of modeling.²³ Our results are expressed in terms of cumulative probabilities.[‡]

Results

Bivariate Analysis

As expected, there are acute differentials by educational status in the probability of having a first birth during adolescence, a trend that has continued over time (Table 2). For young women aged 15–19, the probability of a birth among the less-educated is consistently at least twice that of their more educated counterparts. This also holds true with respect to women aged 20–24 at the time of the survey. In addition, urban teenagers are less likely to have ever given birth than are rural adolescents. Although the direction of the differential is consistent over time, its magnitude does not appear to be as important as that of educational attainment.

Mass media exposure, as measured through television-viewing habits, also appears to effect adolescent fertility. Young women who watch television often are consistently less likely than those who do not to have had a first birth before age 20. Nonwhite adolescents typically demonstrate higher fertility than whites. There is no consistent trend by religious affiliation: Differentials between Catholic adolescents and non-Catholic teenagers vary in direction and magnitude over 10 years.

Results from the Multivariate Models

The multivariate multilevel discrete-time hazard models make it possible to distinguish between structural effects (effects pertaining to the age composition of the population), individuals' formative characteristics (factors of a socioeconomic or cultural nature) and community effects (cluster-level variances) (Table 3).

We applied the model separately to the data sets for 1986, 1991 and 1996 (Model 1). Our results show that education is most strongly associated with delayed child-bearing among adolescents in Northeastern Brazil. It is the only descriptive variable (other than a woman's age) that consistently exercises a negative independent influence on the probability of having a first birth during adolescence, and is statistically significant ($p < .01$) for all three periods.

When we examine cumulative probabilities for individual-level determinants ever found to exercise a statistically significant

Table 2. Probability of having a first birth before age 20, by selected characteristics and current age-group, according to survey year, Northeastern Brazil

Characteristic	1986	1991	1996
ADOLESCENT (15–19)			
Education			
0–4	18.9	14.9	26.1
≥5	5.9	7.4	10.1
Place of residence			
Urban	10.5	10.5	15.2
Rural	15.3	11.9	20.9
Religion			
Catholic	11.6	10.3	17.7
Other/none	15.9	13.9	13.2
Race			
White	u	10.4	15.4
Nonwhite	u	11.1	17.2
Watches TV weekly			
Yes	8.5	9.4	14.9
No	20.2	17.2	27.0
YOUNG ADULT (20–24)			
Education			
0–4	54.0	47.1	46.7
≥5	24.8	21.9	24.7
Place of residence			
Urban	34.7	28.7	30.1
Rural	46.8	43.0	41.2
Religion			
Catholic	36.0	32.7	33.5
Other/none	60.6	35.2	32.1
Race			
White	u	28.6	28.9
Nonwhite	u	34.6	34.9
Watches TV weekly			
Yes	33.5	30.5	32.3
No	49.2	41.8	40.5

Note: Data shown relate to characteristics reported at the time of survey and are weighted to reflect sampling procedures. u=unavailable.

effect on adolescent fertility (Table 4), we find that the magnitude of the impact of educational status has remained relatively stable over time. An adolescent with only primary schooling at the time of the survey is more than twice as likely to have had a first birth as is one with a secondary or higher education, even after the effects of time period, age or other economic and cultural characteristics are taken into account.

Differentials by religious affiliation seem to have become attenuated over time: After controlling for other characteristics, we find that in 1991 and 1996, the difference between Catholics and non-Catholics, which had been important in 1986, was no longer statistically significant. A similar pattern is observed with regard to mass media exposure. While the difference was significant (at $p < .05$) in 1986 and 1991 and in the expected direction (lower fertility among adolescents who watch television regularly), by 1996 there were no major dif-

ferentials by media exposure.

The cumulative effect of place of residence is not significant across all three periods. Similarly, race does not seem to exercise an independent effect in the two DHS surveys that measured this characteristic (1991 and 1996). It seems that other economic and demographic factors, particularly education, largely capture any observed fertility differentials between urban and rural or between white and nonwhite adolescents in Northeastern Brazil (results not shown).

The results of these hazard models seem to be generally robust in explaining fertility differentials over time. For comparison, we created an additional model with pooled information from all three DHS data sets (Table 3, Model 2). In terms of the relative impact of our explanatory variables (excluding race) on the probability that an adolescent would have a first birth, this model revealed tendencies similar to those of the previous models based on individual survey data. Again, an examination of cumulative probabilities (Table 4) indicates that education was the only variable to consistently affect rates of adolescent fertility, and at a magnitude simi-

lar to those previously calculated.

The overall effects of religion and mass media exposure were not consistently significant over time. Interactions between time and religion (Table 3) seem to confirm the waning influence of religious affiliation between 1986 and 1996. The relative effect of mass media exposure now appears to be fluctuating, as we observe differentials in the significance of its influence over time (i.e., it was significantly different from 1996 only in 1991). In-depth ethnographic studies currently being conducted in Brazil on the impact of television on reproductive behavior (and specifically among adolescents) may help shed some light on this trend.²⁴ No independent effect of place of residence is observed across time (results not shown).

Moreover, we observed significant random effects at the cluster level for the two most recent surveys ($p < .05$ in 1991 and $p < .10$ in 1996), which point to the likelihood of unexplained community influences on fertility behavior. This suggests the existence of additional factors (unobserved or unobservable) conditioned by geographic boundaries that may affect the likelihood that an adolescent will give birth.

Table 3. Estimated coefficients from multilevel discrete-time hazard models showing the risk of having a first birth at ages 15–19

Variables	Model 1			Model 2
	1986	1991	1996	Pooled data
Intercept	-0.63	-1.35	-1.81	-0.66** (1986) -1.35** (1991) -1.82** (1996)
Age				
15	-1.51**	-1.19**	-0.57**	-0.57**
16	-1.58**	-1.19**	-0.57**	-0.57**
17	-0.89**	-0.38**	-0.12	-0.12
18	-0.67**	-0.06**	-0.14	0.14
19	ref	ref	ref	ref
Education				
0–4	ref	ref	ref	ref
>5	-1.18**	-1.00**	-1.01**	-1.03**
Religion				
Other/none	ref	ref	ref	ref
Catholic	0.57**	-0.19	0.02	0.02
Watches TV weekly				
No	ref	ref	ref	ref
Yes	-0.08*	-0.33**	-0.17	0.02
Religion–period interaction				
Catholic–1986	na	na	na	-0.59**
Catholic–1991	na	na	na	-0.21
Watches TV–period interaction				
Yes–1986	na	na	na	-0.17
Yes–1991	na	na	na	-0.34*
Random parameter				
Cluster-level	0.15	0.23**	0.11	0.14 (1986) 0.23* (1991) 0.11 (1996)

* $p < .05$. ** $p < .01$. Note: na=not applicable.

Table 4. Cumulative probability of having a first birth at age 15–19, by year of survey, according to selected characteristics

Characteristic	1986	1991	1996
MODEL 1			
Education			
0–4 years	0.48	0.40	0.48
≥5 years	0.20	0.18	0.22
Religion			
Catholic	0.29	0.24	0.30
Other/none	0.44	0.28	0.29
Watches TV weekly			
Yes	0.30	0.24	0.30
No	0.32	0.31	0.29
MODEL 2			
Education			
0–4 years	0.41	0.41	0.41
≥5 years	0.18	0.18	0.18
Religion			
Catholic	0.26	0.26	0.27
Other/none	0.41	0.31	0.26
Watches TV weekly			
Yes	0.36	0.24	0.27
No	0.41	0.31	0.26

and accessibility of family planning services targeting teenagers. Unfortunately, there is a void of systematic studies into the role of the health sector in Brazil's fertility transition.²⁵ We recommend that contextual variables be examined in greater depth in future research drawing on independently collected community-level data.

It has been argued that postponement of first birth and marriage appears to be the most viable means for continuing fertility decline in Brazil and Latin America.²⁶ As sexual activity increasingly begins at younger ages, improved contraceptive accessibility and higher levels of method use would also be a prerequisite for delayed childbearing.

Finally, there is a need for further research into patterns of union formation, both formal and informal, among adolescents and the impact of union on childbearing (keeping in mind the difficulties in tracing a causal relationship). Teenagers may opt for early marriage precisely because of a pregnancy: According to 1996 DHS data, nearly a quarter of all first births to teenagers living in union in Northeast Brazil occurred within the first seven months of marriage. At the same time, unplanned births are more common among never-married teenage mothers (61% in 1996) than among those who have ever been married (34%) or who ever lived in a common-law union (54%). Moreover, the likelihood of union dissolution is significantly greater in consensual unions than in formal marriages. The interactions between these events and socioeconomic

Discussion

Education is the covariate that has been most strongly and consistently associated with delayed childbearing among adolescents in Northeastern Brazil between 1986 and 1996. Fertility differentials by other socioeconomic and cultural traits either are nonsignificant (such as place of residence and race), or are fluctuating and dissipating over time (such as mass media exposure and religion).

At the same time, the independent random variance observed in our multilevel framework at the cluster level in more recent years suggests that unobserved contextual variables might influence individual fertility behavior. Such evidence points to the need for more research into the impact of community facilities: The possibilities include the availability

and cultural characteristics, as well as the implications for single teenage mothers, merit further exploration.

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Resumen

Contexto: La mayor parte de la disminución reciente de la tasa global de fecundidad en el Brasil se debe a las mujeres que se encuentran en el período medio de su edad reproductiva. En forma inversa, está en aumento la proporción de la fecundidad total que corresponde a las adolescentes (las entre 15 y 19 años de edad). Esta tendencia es particularmente acentuada en la región del Nordeste brasileño.

Métodos: Se han utilizado datos del Nordeste brasileño de tres Encuestas Demográficas y de Salud realizadas en 1986, 1991 y 1996, con el fin de examinar las tendencias y los determinantes de la conducta de fecundidad entre las adolescentes de la región. Se utilizaron modelos de riesgo de tiempo discreto para estimar la probabilidad que tiene una mujer de tener su primer embarazo durante su período de adolescencia, y para evaluar los factores individuales y ambientales que pueden influenciar los deseos personales de fecundidad.

Resultados: El nivel de educación de la mujer joven es el factor que está más sólida y coherentemente relacionado con la probabilidad de que una mujer dé a luz durante la adolescencia. En particular, una adolescente que no tenga más que estudios de enseñanza primaria tiene más del

doble de probabilidades de haber dado a luz que una adolescente que tenga por lo menos enseñanza secundaria, aún después de controlar por variables tales como la edad, el período de tiempo y otras características. En el análisis de variables múltiples no se registró un efecto congruente con respecto a la afiliación religiosa o a la exposición a los medios de comunicación.

Conclusiones: La promoción de la educación puede ser el medio más eficaz para alentar a las adolescentes del Nordeste brasileño a postergar su primer alumbramiento. Deben realizarse mayores estudios de investigación con respecto al impacto que producen en la fecundidad de las adolescentes, los programas de la comunidad, especialmente los de salud y de planificación familiar que centran su atención en la población de adolescentes.

Résumé

Contexte: Une bonne partie du déclin enregistré récemment au niveau de l'indice synthétique de fécondité du Brésil l'a été parmi les femmes ayant atteint le milieu de leur vie reproductive. En revanche, la contribution de la fécondité des adolescentes (15 à 19 ans) à cet indice augmente avec le temps, la tendance étant particulièrement accentuée dans la région du nord-est du pays.

Méthodes: Les données de trois Enquêtes démographiques et de santé menées dans le nord-est du Brésil en 1986, 1991 et 1996 servent à l'examen des tendances et facteurs déterminants de la fécondité des adolescentes de la région. Des modèles de risque discrets sont utilisés pour évaluer la probabilité pour une femme de connaître une première maternité en cours d'adolescence, ainsi que pour évaluer les facteurs individuels et environnementaux aptes à influencer les choix personnels de fécondité.

Résultats: Le niveau d'instruction d'une jeune femme représente le facteur le plus fortement et le plus uniformément associé à la probabilité de maternité en cours d'adolescence. En particulier, les adolescentes scolarisées au niveau primaire seulement sont plus de deux fois plus susceptibles d'avoir connu une première maternité que celles ayant bénéficié d'une instruction secondaire au moins, même après application des contrôles d'âge, de période et d'autres caractéristiques. L'affiliation religieuse et l'exposition aux médias ne semblent pas affecter uniformément la fécondité des adolescentes avec le temps dans l'analyse multivariée.

Conclusions: La promotion de l'éducation pourrait offrir le moyen le plus efficace de favoriser le recul de la maternité parmi les adolescentes du nord-est brésilien. Il serait utile d'approfondir la recherche relative à l'incidence sur la fécondité des adolescentes des solutions communautaires (les programmes de planning familial et de santé, notamment) ciblant spécifiquement leur groupe d'âges.

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International Family Planning Perspectives is a peer-reviewed quarterly research journal serving an audience that crosses professional specialties, educational backgrounds and developing-country boundaries. We define family planning broadly, and invite submissions from researchers, policymakers and program providers on such topics as contraceptive practice and research; fertility levels, trends and determinants; adolescent pregnancy; abortion; public policies and legal issues affecting family planning and childbearing; program operation, development and evaluation; information, education and communication activities; sexually transmitted diseases; and reproductive, maternal and child health.

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