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**Brazilian Adolescent Girls' First Birth: Trends and Socialization Influences**

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## **Brazilian Adolescent Girls' First Birth: Trends and Socialization Influences**

### **Introduction**

In Brazil, overall fertility rates have decreased dramatically over the last decade or more. However, Brazil is only one of two Latin American countries where an increase in the fertility rate among adolescents 15-19 years of age has been observed between 1986 and 1996, despite a decline in the total fertility rate and the age-specific fertility rates in all other age groups (Singh, 1998). Between 1983 and 1996, the total fertility rate in Brazil fell from 3.5 to 2.5 births per woman, whereas the age-specific fertility rate among 15-19 year olds rose by 12% from .087 to .097 live births per woman (Arruda et al., 1987; BEMFAM & Macro International, 1997). This contrasts starkly with the age-specific fertility rate in the 20-24 year old age group, which fell by 30% over the same time period, but still remains the highest of all age-specific fertility rates. The trends in Brazil of earlier age of menarche, a slight decrease in the age at first sex and age at first birth, and a rising age at marriage have resulted in a greater number of these teen births occurring among the never-married, divorced and widowed women (Singh, 1998). Among the 15-19 year old females who were married, 45% reported that their last birth was unwanted or mistimed, a striking statistic that rises to 61% among the unmarried (BEMFAM & DHS, 1996; Singh, 1998). The annual abortion rate among 15-49 year old women in Brazil is estimated to be between 22 and 53 abortions per 1,000 women (Singh and Wulf, 1994).

Teen childbearing and unwanted pregnancy can have adverse physical, psychological, economic and social consequences for the individual adolescent, as well as for her partner, family, and wider community. These can range from weakened

nutritional status for the young mother and her child, increased risk at delivery, and complications from induced abortion to school drop out, lack of social support from family and partners, and difficulty entering the formal labor force (Alan Guttmacher Institute, 1998; Bruno & Bailey, 1998; McCauley & Salter, 1995). Unplanned births can result in alienation from friends, family, and partners, lower self-esteem, and a heightened sense of guilt and self-doubt (Billy, Brewster & Grady, 1994; Bruno & Bailey, 1998; Gras, 1998). On the other hand, pregnancy and childbearing may give a young adolescent more responsibility, status and autonomy in her family or community . Above all, it may give her a sense of fulfillment: the feeling of being loved and valued, which often eludes her in an otherwise bleak existence and world that offers her little opportunity for education, economic security and social stability (Billy, Brewster & Grady, 1994; Furstenberg, 1997, Gras, 1998).

These trends in rising adolescent pregnancy and abortion rates and high proportions of unwanted and mistimed births seem to continue despite successful efforts to increase awareness about reproductive health and sexuality through the introduction of school-based sex education curricula and increased access to family planning services. According to findings in the 1996 Brazil DHS, there was nearly universal knowledge of the pill and condom as methods of contraception and 56% of 15-19 year old female adolescents could name at least one source of contraception. Condom use has also increased dramatically in recent years. At first sexual intercourse among girls 15–24 years of age having premarital sex, condom use jumped from 3.8% in 1986 to 49% in 1996 and increased, though less dramatically, from 1.5% to 11.2% among 15–24 year old married women (BEMFAM, 1999).

Using data from the 1986 and 1996 Brazil Demographic and Health Surveys, this study purports to understand why the age-specific fertility rate among adolescents 15–19 years of age has increased despite declines in fertility rates in all the other age groups in Brazil. Is there simply a lag in fertility decline in this age group or are there other social influences, from parents, partners or the media, for example, that may be influencing this trend? This study aims to understand what, if any socialization factors from family, religion, school, peers, partners, work and the media, influence adolescent sexual behavior and the timing of first birth.

The specific research questions to be answered in this paper are:

- 1) What is the relationship between key primary socialization influences (i.e. individual demographic characteristics, household structure) and the age at first birth?
- 2) What is the relationship between key secondary socialization influences (religious affiliation and attendance, communication with peers & partners, current enrollment in school, employment, and media exposure) and the age at first birth?
- 3) How do the relationships between the primary and secondary socialization influences and the age at first birth change between 1986 and 1996?

The theoretical framework underlying this study draws on development contextualism and a life course perspective, which place the adolescent in a historical, socio-cultural and developmental context (Bengston & Allen, 1993; Elder, 1979; Elder, 1980; Lerner, 1995; Miller, 1993; Wertsch & Tulviste, 1992). Development

contextualism emphasizes individual diversity and contextual diversity and the relationship between them. The life course perspective focuses on the interplay between life paths and development, specifying what is the normative or appropriate timing and sequencing of events. The life course perspective takes three different times into account: 1) life time or the life history of a person in a given cultural setting; 2) social time or the differentiation of experience due to age strata and 3) historical time and the range of mentalities across generations (Elder, 1980). These two theories together embed an individual's health within the social context and take into account the multiple physical, cultural, and social dimensions that influence these reproductive health transitions. At the most proximal level are inter-personal relationships with peers, partners, or teachers, for example. More distal is the mesosystem, comprised of interactions between two or more specific settings containing the adolescence, i.e., congruence between the family, school, and peer group. Then there is the larger macro-environment, which includes cultural values and beliefs, opportunity structures, life course options, and the broader socio-political, historical and economic context that affect individual behavior. Although there is a vast literature on the associations between elements in many of these levels and sexual behavior among adolescents in the United States and other developed countries, family dynamics, school settings, peer networks, and relationships with partners are not socially constructed in a universal manner. Therefore, these factors cannot be assumed to operate in the same way in all developing countries or in all regions or sub-populations in any given country (Vance, 1998).

The conceptual model (Figure 1) outlines the relationships and domains tested in this paper.

## Insert Figure 1

The first column on the left depicts the primary socialization influences, considered to be individual demographic characteristics, as well as family and household characteristics that are presumed to be present starting at birth or in early childhood.

Secondary socialization influences are classified as those variables and constructs which become more prominent during adolescence and which are thought to interrelate with the primary socialization influences to ultimately influence the timing of first birth. In the second column, secondary socialization factors, grouped according to broad domains, are classified as those variables and constructs which become more prominent during adolescence and which are thought to interrelate with the primary socialization influences to ultimately influence the timing of first birth. The shaded boxes represent socialization mechanisms, including social support, social control and the social construction of adolescence and pregnancy, which prior exploratory qualitative research suggested may be influential pathways through which the primary and secondary socialization influences affect these reproductive transitions.

### **Data**

The data used in this analysis are drawn from the 1986 and 1996 Brazil Demographic and Health Surveys (DHS). This secondary data analysis used data from the household and individual level questionnaires in each survey year and focused on a sub-sample of female adolescents (age 15-19) and young adults (age 20-24). In 1986, there were a total of 2,486 females 15-24 years of age. In the 1996 DHS, there were

4,357 females 15-24 years of age. Table 6.1 displays the sample sizes for the sexually active, parous, and total female populations by age group and survey year.

**Table 1: Sample size for sexually active, parous and all females in 1986 and 1996 Brazil DHS**

<i>Population</i>	<i>1986 DHS 15–19</i>	<i>1986 DHS 20–24</i>	<i>1996 DHS 15–19</i>	<i>1996 DHS 20–24</i>
Sexually active	222	657	830	1423
Females with first birth	141	580	384	930
All females	1318	1168	2464	1893

Household-level data corresponding to these individuals were also used. Where possible, information on household size, wealth, structure, and number of cohabiting siblings in the household questionnaire at each wave was matched to individual-level data from the corresponding adolescents who were interviewed.

A number of primary socialization influences, including individual socio-demographic characteristics (region of residence, ethnicity, urban/rural residence, time in place of residence, education, marital status, age) and household and family characteristics (household wealth, size of household, household structure, number of siblings, parents' education, and communication with parents about family planning) were considered important in the timing of first birth. In addition, potential secondary socialization influences from the domains of religion, peers, partners, school, work, and the media were also included in this analysis. Appendix A lists the variables included in this analysis and describes their operationalization. All variables were measured at the time of the survey. Some variables available in 1986 are not available in 1996 and vice versa. A list of all the variables available for each of the domains and survey years is found in Appendix B. Furthermore, certain variables, (i.e. educational level of parent, partner's education and type of employment) were only available for those adolescents living with one or both parents or those having a partner, thereby reducing the sample

size. Other variables had to be created slightly differently in 1986 than in 1996. For example, in 1996 the variable for living with a parent was derived from the household roster whereas in 1986 it was derived from a question in the individual questionnaire about who was the head of household. Because in 1986 this variable did not accurately reflect all those adolescents living with one or both parents, it was not included in the analysis.

The analyses were stratified into four groups: 1) total sample of sexually active adolescents 15-24 years of age; 2) sub-sample of 15-24 year olds currently with a partner; 3) sub-sample of 15-24 year olds living with one or both parents and 4) a sub-sample of 15-24 year olds currently with a partner and living with one or both parents. These four groups were defined in part by methodological limitations (i.e. partner or parent variables only available for adolescents with partners or living with parents) and in part for theoretical reasons. Because marriage (or its proxy of having a partner) and living outside of the natal home are important transitions in the lives of an adolescent, it was considered worthwhile to analyze whether reproductive behaviors differed significantly according to these groups. The sample sizes of the various sub-samples in both the 1986 and 1996 Brazil DHS are displayed in Table 2 below.

**Table 2: Sample size of sub-samples in 1986 and 1996 Brazil DHS**

<i>Population</i>	<i>All sexually active</i>	<i>With partners</i>	<i>Living w/ parents</i>	<i>With partners &amp; parents</i>
1986 DHS	2129	744	n.a.	n.a.
1996 DHS	4475	1406	2896	316

Models were constructed in both 1986 and 1996 for the first two sub-samples, but due to sample size limitations in 1986, models for the third and fourth sub-samples could only be constructed in 1996. There were different variables available in both 1986 and 1996, as well as in the different sub-samples, which prohibits a strict comparison of



models across time and sub-sample. The analysis of the total sample does not include the partners' or parents' characteristics. The second sub-group is analogous to those married at the time of the survey and includes partner variables, such as partner's education, employment, and age gap, while the third group identifies young girls who may or may not be married but are still living with one or both of their parents. The fourth sub-group was comprised of girls who had a partner or were married but still lived with one or both parents.

Both the 1986 and 1996 Brazil DHS are nationally representative samples, based on a two-stage cluster-sampling design in which first census tracts from each of the seven regions and subsequently households were selected. Household and individual questionnaires were administered to all women 15-45 years of age present in the household. In the 1986 DHS, information was gathered from 98.7% of the households selected (8,519 households). For the 1986 DHS, 87.5% per cent of the women aged 15-44 inhabiting the selected households were interviewed for a total sample of 5,892 women. In the 1996 DHS, information was gathered from 93.2% of the households selected (13,282 households). Eighty-six percent of the women inhabiting the selected households were interviewed for a total sample of 12,612 women.

### **Analytic methods**

A discrete-time Cox proportional hazard model was used to analyze trends and socialization influences related to the age at first birth among 15-24 year old female Brazilian adolescents (Allison, 1982). A modified maximum likelihood estimation technique was used to fit the model. Rather than specify the shape of the underlying

hazard function, this technique assumed the hazard ratio was constant over time (Steele, Curtis & Choe, 1999). The model was specified as:

$$h_x(t) = h_0(t)e^{\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3}$$

for all  $t$  where  $t$  is time,  $h_0(t)$  is the baseline hazard and  $e^{\beta_1}$  is the hazard ratio comparing those with  $X_1=x$  to those with  $X_1=x+1$ . In hazard models, a parameter estimate of one (1) means the hazard rate does not change with the covariate values. A parameter estimate greater than one (1) indicates an increasing hazard (earlier age at first birth) and a parameter estimate less than one (1) indicates a decreasing hazard (later age at first birth). Significance in the final models was assessed at the  $p < .1$ ,  $p < .05$ ,  $p < .01$  and  $p < .001$  levels. The discrete time hazard model is appropriate in a case such as this, where the dependent variable is the log odds of an adolescent having a first birth at a given time  $t$ . The model estimation adjusts for censored observations, (i.e., those who have not yet given birth at a given age). Time-dependent variables such as time in place of residence, years of education and being married were not treated as time-varying covariates, which this model allows for, but included in the model as dichotomous dummy variables. An underlying assumption of the Cox proportional hazards model is that censoring was independent of the outcome of interest, which is reasonable when nearly everyone in the population eventually experiences the event, (i.e. gives birth) (Allison, 1982).

First, the values of the household-level variables, individual demographic characteristics, and socialization influences for 15–24 year olds in the 1986 and 1996 cohorts were compared to assess contextual changes over time. Next, bivariate analyses were conducted to establish the crude relationships between the individual demographic characteristics, other independent variables representing the primary and secondary

socialization influences and the dependent variable: age at first birth. One-year time intervals were used, and the total sample size depended on the number of censored observations. To check for collinearity and ascertain that two variables were not both correlated and measuring the same construct, Pearson correlation statistics were calculated. No variables were found to be perfectly correlated in the correlation matrix. However, there may have been a high correlation between urban/rural residence and place of residence (capital, city, town, rural) in a model, in which case the urban/rural dummy variable was automatically dropped by the analytical software program (STATA).

Life-tables and Kaplan–Meier plots for the age at first birth for the 1986 and 1996 cohorts were generated. Next, simple stratified evaluations of the association between the various primary and secondary socialization influences and the likelihood of first birth were tabulated. Within each of the four sub-samples described earlier, three models were tested. The first model tested the effect on the age at first birth of all the primary socialization variables, which included the individual demographic characteristics and household characteristics.

The second model tested the joint effect of all the primary socialization variables and all the variables available within each of the five secondary socialization domains (i.e. religion, peers/partner, school, media and work) on the outcome. This multivariate discrete–time hazard model enabled the distinction to be made between the effect of demographic characteristics pertaining to the age composition of the population and the structural effects resulting from changes in the different secondary socialization influences. By over-specifying the model and including both significant and non–

significant primary socialization influences, one incurs less potential bias than if important control variables had been omitted from the model. To test for the significance of the addition of the entire group of secondary socialization variables, a log likelihood ratio test was conducted within each sub-sample, comparing the full unrestricted model (Model II) with the restricted model of only the primary socialization variables (Model I) (Table 10). If the test statistic was significant, the variables added to the model contributed significantly to a specification of the model.

A third and final model was constructed using reverse stepwise regression, in which all significant and non-significant primary socialization influences were controlled for and remained in the model and all non-significant secondary socialization influences were dropped. If an independent secondary socialization variable was not significant at the  $p < 0.1$  level in Model II, it was dropped by the reverse stepwise regression model and not included in Model III. This final model tested the relative impact of the secondary socialization influences on the outcome of interest, when controlling for individual and household characteristics. If secondary socialization variables were significant in both Model II and Model III and the hazard rates for the primary socialization influences changed significantly, inferences were drawn about potential mediating pathways between the primary socialization influences and the outcome of interest.

Lastly, Kaplan–Meier curves were generated for those secondary socialization influences that were significantly associated with age at first sex in Model III of the total and partner sub–samples in both 1986 and 1996.

### **Background/Descriptive statistics**

Descriptive statistics for the variables considered in this study are depicted in Table 3. Between 1986 and 1996, the age at first birth has risen slightly from 18.09 years

to 18.14 years of age. When considering only 15-19 year olds, the age at first birth (16.63 years) remained unchanged during this time. On the other hand, the percentage of 15-24 year olds who were married decreased slightly in that ten year period from 39% to 33% indicating that a greater proportion of births in this age group were to unmarried young women.

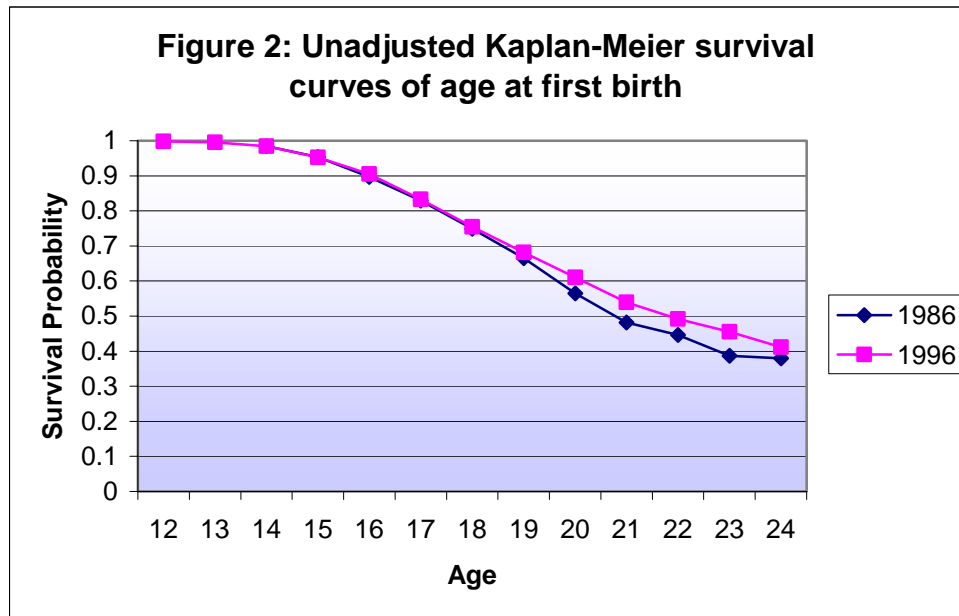


Figure 2 above displays the unadjusted survival function for age at first birth (probability of not having a birth by a specified age) for 15–24 year olds. The curves overlap until 19 years of age, after which the probability of having a first birth is greater for 20–24 year olds in 1986 than for 20–24 year olds in 1996. By 21.5 years of age in 1986 and 22.5 years of age in 1996, 50% of the 15–24 year olds had had a first birth.

## Results

The results from the total sample in 1986 will be presented first, followed by the results for the sub-sample with partners. For each sample, Model I, with only primary

socialization influences, and Model III, the final model after reverse stepwise regression with all significant and non-significant primary socialization influences and remaining significant secondary socialization influences, will be discussed. The results for Model II, including all significant and non-significant primary and secondary socialization influences, can be seen in the corresponding tables, but are not presented in this section unless notably different from Model III. Finally, results from the comparison between the total and partner samples in 1986 and 1996 are presented. This comparison draws on two identically specified models in which only those variables available in both survey years were included.

### **1986 hazard models of age at first birth**

In Model I of the total sample of female adolescents 15-24 years of age (Table 4), living in larger households and being married were associated with an earlier age at first birth. Not surprisingly, married adolescents had a first birth at twenty-two times the rate of unmarried adolescents.<sup>1</sup> Aside from being married, only living in a larger household (relative hazard, 1.12;  $p < .01$ ) and in rural areas (relative hazard, 1.65;  $p < .01$ ), were also associated with an earlier age at first birth. All the other significant primary socialization influences in Model I, namely living with at least one parent (relative hazard, .46;  $p < .01$ ), being older (relative hazard, .66,  $p < .001$ ) and having initiated sex at a later age (relative hazard, .92;  $p < .05$ ) were all associated with a decreased hazard of having a first birth. In 1986, there were no significant differences in the rate at which adolescents had a first birth by region, household wealth, education or number of residences. No secondary socialization influences were significant in either Model II or Model III of the total

sample. Among the primary socialization influences, the only previously significant association from Model I that disappeared was rural residence. All the other significant parameter estimates in model I remained robust and significant in Model II and III after the addition of the secondary socialization influences.

In the sub-sample of 15-24 year olds who had a partner (Table 6.5), marital status was now dropped from the model because it was highly correlated with having a partner. The same primary socialization influences that were significant in Model I. The only difference was that in the partner sample, there were no significant differences in the hazard of giving birth for adolescents living with at least one parent (as there was in the total sample). In the partner sub-sample, those who had lived in more than one place in the previous ten years were seen to have a first birth at a marginally faster rate (relative hazard, 1.64;  $p < .1$ ) than adolescents who had not relocated. In Model III, significant differences in the rate of having a first birth by place of residence and relocation disappeared. In this sub-sample, partner's employment in skilled (relative hazard, .64;  $p < .01$ ), clerical or sales work (relative hazard, .41;  $p < .01$ ) as well as an adolescent's employment in skilled work (relative hazard, .36,  $p < .01$ ) were found to be associated with a significantly later age at first birth than adolescents or those with partners who were unemployed or in unskilled work. The hazard ratios of all the primary socialization influences varied widely from Model I to Model III and even changed direction, which indicates that the addition of the secondary socialization influences was likely to alter the relationship between the primary influences and the outcome of interest.

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<sup>1</sup> The magnitude of this effect is due to marriage being a highly endogenous variable and highly correlated with the outcome. The number of pre-marital births increased between 1986 and 1996 from 34% to 38% whereas the proportion of married 15-24 year olds decreased from 39% to 33%.

Of the significant primary socialization influences in Model I, only the hazard ratios for age at first sex and age changed significantly between Model II and Model III. This suggests that partner's or adolescent's employment could be mediating the relationship between the age at first sex or age and age at first birth.

### **1996 hazard models for age at first birth**

The results from Models I and III for each of the four sub-samples in 1996 will be discussed in sequential order. In Model I of the total sample (Table 6), many primary socialization influences at the household- and individual-levels were significantly related to age at first birth. Four variables, including being married (relative hazard, 6.87,  $p < .001$ ), larger household size (relative hazard, 1.18;  $p < .001$ ), and living in a town (relative hazard, 1.19;  $p < .05$ ) or rural area (relative hazard,  $p < .01$ ) were associated with an increased hazard of having a first birth.<sup>2</sup> All other household, education, and demographic factors were associated with a decreased hazard of having a first birth. Compared to adolescents living in low-wealth households, adolescents living in medium-low wealth or higher wealth households had an incrementally and significantly slower rate of giving birth. Furthermore, adolescents with a greater number of siblings (relative hazard, .82;  $p < .01$ ) and with a complete secondary school education (relative hazard, .66;  $p < .001$ ) had their first birth at a slower rate than those with fewer siblings, living in a city, or with less education. Not surprisingly, adolescents who were older (relative hazard, .93;  $p < .001$ ) and who had initiated sexual activity later (relative hazard, .75;

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<sup>2</sup> Being married was the variable most strongly associated with age at first birth, though the parameter estimate was not as high as in 1986. Premarital births among 15-24 year olds increased from 34% in 1986 to 38% in 1996. Consequently, marriage becomes a weaker predictor of age at first birth in 1996, but nevertheless remained highly endogenous.



$p < .001$ ) also experienced a significantly slower rate of childbearing than those who were younger or became sexually active sooner.

In model III, all the significant primary socialization influences from Model I remained robust and significant, except living in a town. There are several secondary socialization influences from the domains of religion, employment, and media that remained in this model and were significantly associated with age at first birth after the primary socialization influences were controlled for. Adolescents who were currently in school had their first birth at a significantly later age (relative hazard, .63;  $p < .001$ ) than those who were not in school. As hypothesized, adolescents who attended religious services at least once a week had a significantly slower rate (relative hazard, .85;  $p < .05$ ) of giving birth than those of no religiosity. Finally, adolescents who were exposed to family planning messages on both the radio and television had a first birth at a marginally slower rate (relative hazard, .85;  $p < .1$ ) than those who had not been exposed to family planning in the mass media. Although religiosity, current enrollment in school and high media viewing could potentially mediate the relationships between education, marital status, household wealth and the age at first birth, it is unlikely because the parameter estimates for these primary socialization influences do not change significantly when the secondary variables were either included or excluded from the model.

When considering the sub-sample of adolescents who have partners (Table 7), in Model I, the variables that were significant mirrored those in the total sample. The only notable exception was that adolescents living in town now had a significantly faster rate (relative hazard, 1.19;  $p < .1$ ) of having a first birth. Marriage was not included in this model because it was highly correlated with having a partner. As in the total sample,

household size, household wealth, number of siblings, rural residence, completed secondary education, being married, age at first sex and age were all again associated with the timing of first birth. There were no significant differences in the rate of giving birth by urban/rural residence, region, number of parents in the household or time in place of residence.

In model III of the partner sub-sample, all the significant primary socialization influences remained robust and significant. Living in a town was the only additional factor that became significant. Adolescents living in a town also had a significantly faster rate of giving birth than adolescents living in capitals and large cities. In addition to these primary socialization influences, a variety of secondary socialization influences from the domain of peers, partner and employment were significant. Adolescents who communicated with their peers about family planning had a faster rate (relative hazard, 1.20;  $p < .05$ ) of giving birth than adolescents who had not communicated with their peers. Furthermore, adolescents with partners employed in skilled labor had a marginally slower rate (relative hazard, .79;  $p < .1$ ) of giving birth than those with partners who were unemployed or in unskilled work. Adolescents who were themselves employed in skilled labor also experienced a significantly slower rate of having a first birth than those who were unemployed or in unskilled labor.

In the third sub-sample of adolescents living with one or both parents (Table 6.8), there again was no difference compared to the total sample in the primary socialization influences that were significant in Model I. The one exception was that adolescents who had relocated in the previous ten years were now seen to have a significantly later age at first birth than those who had not moved. In Model III, when the significant secondary

socialization influences were included in the model, all the hazard ratios for the significant variables remained robust. Furthermore, several secondary socialization influences from the domains of religion, school, and media were significantly associated with the timing of first birth. Adolescents who attended religious services at least once a week had a first birth at a significantly slower rate (relative hazard, .605,  $p < .01$ ) than those of no religiosity. Being currently enrolled in school also was associated with a significantly slower rate (relative hazard, .451;  $p < .001$ ) of first birth. Lastly, adolescents who had seen family planning messages in newspapers, magazines and brochures were associated with having a significantly faster (relative hazard, 1.43;  $p < .05$ ) rate of giving birth than those who had not been exposed to any family planning messages in the print media.

In the final sub-sample ( $n=313$ ) of 15–24 year olds who have a partner and also live with one or both parents (Table 9), in Model I, only age, age at first sex, and four household-level variables, including place of residence, number of siblings, household size and household wealth were associated with a significant difference in the hazard of first birth. Living in larger households (relative hazard, 1.23;  $p < .001$ ) was associated with an earlier age at first birth whereas the a greater number of siblings had the inverse association (relative hazard, .79,  $p < .001$ ) and was related to a later age at first birth. Adolescents living in a city (relative hazard, 1.46;  $p < .1$ ), town (relative hazard, 1.47;  $p < .1$ ) or rural area (relative hazard, 1.51;  $p < .1$ ) experienced a marginally higher hazard or earlier age at first birth compared to those living in capitals or large cities. No differences in the timing of first birth were found by education in this sub-sample.

After the addition of the secondary socialization influences, only media exposure remained significantly associated with the timing of first birth in Model III. Adolescents who had read the newspaper and/or watched television once a week and/or listened to the radio once a day had a 59–64% faster rate or earlier age at first birth than adolescents with less media exposure.

A log-likelihood test was conducted between the restricted Model I (with only primary influences) and the unrestricted Model II (with both primary and secondary socialization influences) in each of the six sub-samples. In all cases, the addition of the secondary socialization variables made a significant difference in the overall fit of the model (Table 10).

### **1986 and 1996 Comparison**

Table 11 displays the models comparing the total and partner samples in each of the two survey years. The models included only those variables that were identically measured and available in both survey years and hence were similarly specified, though the sample sizes were different. Results show that in both the 1986 and 1996 models for the total sample, several individual- and household-level primary socialization influences were significantly associated with the timing of first birth. Being married consistently had the largest hazard ratio and was most strongly associated with an earlier age at first birth. The magnitude of the effect of marriage diminished significantly between 1986 (relative hazard, 29.88;  $p < .001$ ) and 1996 (relative hazard, 3.09;  $p < .001$ ), in part due to the increase over time in the proportion of pre-marital births, the rise in the average age at marriage and the decline in the proportion of 15–24 year olds who were married. Other primary socialization factors associated with a significantly decreased hazard in

both 1986 and 1996 included older age and later age at first sexual intercourse.

Household size was associated with an increased hazard or later age at first birth in both 1986 and 1996, though the effect diminished over time. Household wealth also emerged as a variable significantly associated with the timing of first birth. However, in 1986, living in medium–low wealth households was associated with an earlier age at first birth (relative hazard, 1.52;  $p < .05$ ) whereas living in high (relative hazard, .713;  $p < .05$ ) and medium-high wealth (relative hazard, .784;  $p < .05$ ) households were associated with a later age at first birth. Marginal differences by education and region of residence in the hazard of having a first birth only emerged in 1996.

In 1986, no secondary socialization influences were significant in the presence of the primary influences. However in 1996, religion and media variables appeared to be significantly associated with the timing of first birth. Adolescents who attended religious services at least once a week and those who had high media exposure had a significantly slower rate of having a first birth than adolescents with no religiosity or low media exposure.

In the partner sub-sample in Table 11, larger household size and later age at first sex were again strongly associated with an earlier and later age at first sex, respectively. No other primary socialization influences were significant in 1986, though in 1996, significant differences in the rate of having a first birth emerged by age, household wealth, region and place of residence. Living in a medium–high or higher wealth household was associated with a decreased hazard of having a first birth, as was living in the North/Northeast region and older age. On the other hand, living in a town or rural area were significantly associated with an increased hazard of having a first birth.

Among the secondary socialization influences, variables from the domains of religion, partner, employment, and the media were significantly associated with the timing of first birth, though only being employed or having partners who were employed in skilled labor emerged as being associated with a significantly lower hazard, or later age at first birth, in both 1986 and 1996. In 1986, adolescents who were themselves employed in clerical/technical work (relative hazard, .48,  $p < .001$ ) or who had partners employed in clerical/technical work (relative hazard, .39;  $p < .05$ ) had a slower rate of having a birth than those adolescents who had partners or who themselves were unemployed or in unskilled labor. In 1996, being of evangelical/protestant faith was associated with an earlier age at first birth (relative hazard, 1.33;  $p < .1$ ) while high exposure to the media was associated with a later age at first birth.

### **Discussion**

Findings from the progression of models show that very few primary socialization influences were significantly associated with the timing of first birth among Brazilian adolescent females, though there were more in 1996 than in 1986. Aside from the anticipated differences by marital status, age, and age at first sex in the hazard rates of having a first birth, there were surprisingly few, if any, significant differences by region and number of residences. This would suggest that teen childbearing is widespread in Brazil and not affected much by region of residence. Significant household wealth, educational and urban/rural differentials in the age at first birth only appeared in some sub-samples in 1996. Structural adjustment and privatization in Brazil has been accompanied by migration to urban areas and led to growing disparities in income, education and place of residence, which can explain why some of these primary

socialization influences are associated with the adolescents' reproductive behavior and timing of first birth.

The importance of the family and household-level factors in the timing of first birth is further supported by the fact that in the models in 1996, the hazard ratios of the primary socialization influences do not change significantly with the addition and backwards elimination of the secondary socialization influences. Household size (in 1986 and 1996), living with parents (in 1986), and household wealth (in 1996) were significantly associated with the timing of first birth in Models III, pointing to the continued presence and role of household and family characteristics in the shaping of adolescent sexual norms and behavior. The finding that larger household size was associated with an earlier age at first birth whereas a greater number of siblings was associated with a later age at first birth seem to contradict each other. A possible explanation for this is that household size is a measure of the household in which an adolescent currently resides, which often could be the home of a partner or relative whereas number of siblings is a measure of the natal home. Those with more siblings in the home may have a stronger family infrastructure, more social support, and be expected to care for younger children and assume adult responsibilities as an adolescent. Household size may also be an endogenous variable. In the case of those living with relatives or partners, the first birth have lead to an adolescent leaving her parents' home and moving in with relatives or the partner's family. Another possible explanation for this effect is that adolescents who living with relatives are more likely to have to care for nieces, nephews, or somebody else's children but prefer to have their own child to care for, feel responsible towards, and provide them with company. Similarly, adolescents

living with partners are more likely to be married and to have a child than those still living with their parents.

It is interesting to note, however, that in 1986, the hazard ratios of many of the primary socialization influences changed substantially with the addition of the secondary socialization influences to the models. This suggests that perhaps other factors besides individual, household and family characteristics were more influential in the timing of adolescents' first birth. This finding supports the hypothesized linkages and theoretical underpinnings of the conceptual framework. The framework assumes that with the onset of adolescence and gradual developmental maturity, influences from the family and household diminish and other socialization influences, i.e., from religion, media, school, peers, and partners become increasingly important for adolescents' reproductive health behaviors. Furthermore, in taking a life course perspective and focusing on the historical and social context in which behaviors occur, one accepts that the larger the cohort of adolescents, the greater the opportunity for socialization from a variety of sources. Until recently, the proportion of the population in Brazil between 15–24 years of age continued to rise and consequently, the potential for other socialization influences, such as school, media, partners, and peers to influence adolescents would seem to rise. No secondary socialization influences were significantly associated with the timing of first birth in the total sample in 1986. However, by 1996, adolescents who were highly religious and highly exposed to mass media had a significantly later age at first birth than those who were not religious or had no exposure to mass media. Media and religion variables were significant in all 1996 models except in the partner sub-sample, indicating that for three–



quarters of the adolescent population, these two domains were important sources of influence on adolescents' sexual behavior.

There was no consistent pattern of significance or even direction of influence from the secondary socialization factors across the six different models, though effects were seen from religion, partners, employment, media and school. In fact, the results, with respect to the influences of the media were inconclusive. In the total sample in 1996, high media viewing frequency was associated with an increased hazard of first birth, whereas in the sub-sample of adolescents with a partner and living with parents, this same influence was associated with a decreased hazard. Media exposure is again a potentially endogenous variable. Adolescents more exposed to mass media may be getting useful and appropriate information from television or radio and delaying childbearing but they may also be getting mixed messages and unclear, sexually provocative and incorrect information which could lead to an earlier age at first birth. The causal direction could also be such that adolescents with a first birth are more likely to be home and able to watch television. They may also be more likely to pay attention to family planning messages and information about childbearing.

Even in the similarly specified models in Table 11, the only two secondary socialization factors that were significantly associated with a later age at first birth in both 1986 and 1996 were in the partner sub-sample and included adolescents employed in skilled labor and adolescents whose partner was employed in skilled labor. This finding may reflect the selection of partners and a trend in which girls increasingly wish to delay childbearing until they have either found work themselves or have a partner who is older, more financially stable, and able to provide for them and any children.

Communication with peers was a secondary socialization influence that was significantly associated with an earlier age at first birth only in Model III of the 1996 partner sub-sample. It is not surprising that peer pressure exerts greater influence on the age at first birth among adolescents with partners. Because motherhood is still a much-cherished role in Brazilian society which forces a young girl to prematurely assume adult responsibilities and thereby offers her opportunities for developmental maturity and social status that education and employment currently can not, many young girls may be encouraged to get pregnant if they have other friends who already have children.

Current enrollment in school is also a significant secondary socialization influence associated with a later age at first birth in 1996, but only in the total sample and those living with a parent. It is widely accepted that education provides the best means for girls to become more empowered, more capable of making informed and satisfying reproductive health choices, and ultimately taking control over their destinies. The effect of education on reproductive health behavior decreases if adolescents remain in school beyond the primary level.

### **Policy and Program Implications**

These results suggest that secondary socialization influences are indeed associated with the age at first birth. The fact that current enrollment in school was a significant factor in delaying childbearing indicates that particularly for girls still living with at least one parent, efforts to deliver and improve school-based health education programs is warranted. The consistently strong association between religiosity and later age at first birth in many of the models suggests that spirituality may be a catalyst for critical awareness about reproductive health issues, i.e. contraception or abortion and provoke

young girls to consider the risks and benefits of their actions. Future interventions and prevention efforts should therefore not dismiss the information, social support network and moral code that the religious institutions provide to adolescents but seek to address them and/or collaborate with religious organizations in better addressing the needs of youth in Brazil. For example, school-based programs could effectively collaborate with community-based religious organizations, providing both rational, scientifically-based information as well as ethics- and value-based information which ultimately can guide adolescents in making appropriate choices.

The findings also show a significant association between many of the household and family-level influences, indicating that contextualizing the adolescent and for example, counseling adolescents together with their parents, conducting information/education/communication (IEC) workshops with parents prior to the onset of or early in adolescence, and incorporating parents into school-based health education programs could be invaluable for promoting healthy sexuality and improving the reproductive health of adolescents. Other community-level factors, such as teachers, peers, and employers also need to be incorporated into health education and pregnancy prevention efforts. Because working in skilled labor seemed to act as a disincentive to having children, providing more skill-based job training and offering young girls more opportunities to work outside of the domestic sphere would not only provide financial support to girls, but address their self-esteem, psychological well-being and indirectly their reproductive health. Partner's education and employment in skilled work were also strongly associated with a later age at first birth in both the 1986 and 1996 sub-samples, highlighting the need to target partners more aggressively and providing them with

accurate information, better conflict resolution/communication/negotiation skills training, and encouragement to assume greater responsibility in their relationships and parenting.

Lastly, because the effect of media exposure on age at first birth varied in different sub-samples, it is important to discern how different sub-samples vary in their viewing patterns, types of shows watched, and the interpretation of the messages transmitted through media. This information is critical before media messages aimed at delaying the age at first birth can be accurately designed and targeted to the diverse adolescent population. Though not within the scope of this data set, information about violence/rape within relationships, wantedness of pregnancy, abortion rates and infant mortality rates would be helpful in better determining what the key forces are that affect the timing of first birth.

**Table 3: Descriptive statistics for female adolescents 15-24 years of age, 1986 and 1996 Brazil DHS**

Variable	Description	1986 (%)	1996 (%)
AGE1SEX	Mean age at first sexual intercourse	17.44	17.01
AGEBIRTH	Mean age at first birth	18.09	18.14
AGE	Age in years	19.16	19.06
Region	Region of residence		
RIOSAO*	Rio/Sao Paulo	4	15
CENTRAL	Central East/West	14	21
SOUTH	South	17	10
NORTHNE	North/Northeast	66	53
Place of Residence	De facto place of residence		
CAPITAL*	Capital/large city	18	36
CITY	City	---	23
TOWN	Town	43	22
RURAL	Rural	39	19
Time in place of residence	Number of places adolescent of a given age has lived in previous 5 years		
RES1COMM	Lived in one place in previous 10 years	33	80
RES2COMM*	Lived in >1 place in previous 10 years	67	20
SEXACT	Sexually active	41	50
MARRIED	Currently or formerly married	39	33
Educational level	Level of education		
LOWEDUC*	No/incomplete primary education	75	59
MEDEDUC	Complete primary/incomplete secondary	13	26
HIEDUC	Complete secondary/higher education	10	15
TOILET	Flush toilet in household	20	37
HOUSESIZE	Total number of household members	5.49	5.46
Household wealth	Household wealth (index composed of 6 household assets, including radio, car, TV, vacuum cleaner, washing machine)		
LOWSES*	Low SES= 0 assets, Medium/Low SES=1-2 assets,	22	7
MEDLOWSES	Medium/High SES=3-4 assets, High SES=	57	47
MEDHISES	>=5 assets	17	34
HISES		4	12
Religion			
CATHOLIC	Roman Catholic	84	79
EVANPROT	Evangelical/Pentecostal/Protestant/Mormons	6	13
SPIRITOTH*	Spiritist/Umbanda/Candomble/Jewish/Buddhist/No religion	10	9
Religiosity			
LOWRELIG*	Does not attend/attends less than once/month	32	39
MEDRELIG	Attends twice a week or once a month	35	24
HIGHRELIG	Attends at least once a week	33	37
PRNTCOMM	Communicated with either mother or father about family planning	---	6
PEERCOMM	Communicated with peers about FP	---	25
PARTCOMM	Communicated with partner about FP	---	3
AGEGAP	Partner more than 5 years older	---	32
Partner's education	Current partner's educational level		
PARTLOEDUC*	No education/incomplete primary education	10	29
PARTMEDUC	Complete primary/incomplete secondary	78	56
PARTHIEDUC	Complete secondary/higher education	12	15

Partner's employment PARTNOWORK*	Current partner's type of employment Unemployed/Unskilled/agricultural	36	15
PARTSKILL	Skilled/domestic work	24	14
PARTSERV	Clerical/sales or services work	17	47
PARTTECH	Professional/technical work	23	25
Employment NOWORK*	Current type of employment Unemployed/unskilled/agricultural work	67	15
SKILL	Skilled/domestic work	17	14
CLERSERV+	Clerical/sales/services	16	47
PROFTECH	Professional/technical	---	25
Media viewing frequency HIMEDFRQ	Frequency of media viewing Reads newspaper and watches TV once/wk and listens to radio once a day	28	45
MEDMEDFRQ	Two of above	34	38
LOMEDFRQ*	None or one of the above	38	16
Mass media exposure	Exposure to family planning messages on TV or radio		
HIMASSMD	Exposure on both TV and radio	--	23
MEDMASSMD	Exposure on either TV or radio	--	28
LOMASSMD*	No exposure through TV or radio	--	50
Print media exposure	Exposure to family planning message in newspaper, pamphlet or brochure		
HIPRINT	Exposure to FP message in all three media	--	17
MEDPRINT	Exposure to FP message in 1-2 of above	--	34
LOPRINT*	No exposure to FP message in any of above	--	49
Ethnicity WHITE	Ethnicity	--	36
MIXED*	Mixed, Black, Indian, Asian	--	64
Household structure 2PARENT	Living in household with parents Living with both parents	--	49
1PARENT	Living with one parent	--	16
0 PARENT*	Living with neither parent	--	36
SIBLING	Mean number of siblings living in household	--	1.55
Father's educational level DADNOED*	Parents' educational level No or incomplete primary education	.29	--
DADPRIMED	Complete primary/incomplete secondary	.66	--
DADSECED	Complete secondary/higher education	.04	--
Mother's educational level MOMNOED*	No or incomplete primary education	.29	--
MOMPRIMED	Complete primary/incomplete secondary	.63	--
MOMSECED	Complete secondary/higher education	.09	--
Household head educ. level HHNOED*	No or incomplete primary education	.29	--
HHPRIMED	Complete primary/incomplete secondary	.65	--
HHSECED	Complete secondary/higher education	.06	--

1 Unless indicated, all variables coded as 1 = yes and 0 = no.

(\* ) = Reference category. For dichotomous or continuous variables, 0 is reference category.

+ In 1986 this category included professional/technical work

**Table 4: Relationship between socialization influences and age at first birth: An analysis of the total sample of females 15-24 year olds in the 1986 DHS using a Cox proportional hazards model**

Variable†	Model I		Model II		Model III	
	Primary only Hazard Ratio	S.E.	W/ Secondary Hazard Ratio	S.E.	Reverse Stepwise Hazard Ratio	S.E.
<b>Primary Influences</b>						
HOUSESIZE	1.122***	0.035	1.114***	0.025	1.105***	0.027
TOILET	1.195	0.283	0.986	0.194	0.926	0.223
HISES	0.529	0.245	1.129	0.529	1.128	0.501
MEDHISES	0.715	0.209	0.956	0.258	1.084	0.353
MEDLOSES	0.948	0.209	1.279	0.245	1.412	0.293
>=1PARENT	0.461**	0.109	0.531**	0.122	0.552*	0.253
NORTHNE	1.233	0.486	1.300	0.556	1.274	0.459
CENTRAL	1.019	0.409	1.107	0.477	1.105	0.449
SOUTH	0.789	0.314	0.962	0.406	0.886	0.452
TOWN	1.019	0.210	0.870	0.226	0.912	0.282
RURAL	1.647*	0.365	1.179	0.256	1.256	0.231
RES1COMM	1.485	0.395	1.270	0.316	1.259	0.265
MEDEDUC	1.218	0.352	1.271	0.399	1.305	0.321
HIEDUC	0.752	0.193	0.922	0.313	0.770	0.261
MARRIED	22.293***	7.107	21.517***	7.784	23.739***	0.397
AGE1SEX	0.920*	0.039	0.672***	0.036	0.681***	0.052
AGE	0.661***	0.034	0.926~	0.041	0.930	0.048
<b>Secondary Influences</b>						
Religion – CATHOLIC			1.256	0.477		
EVANPROT			0.908	0.396		
HIRELIG			0.963	0.201		
MEDRELIG			0.793	0.135		
Partner – PARTMEDUC						
PARTHIEDUC						
PARTSKILL						
PARTSERV						
PARTTECH						
Work – SKILL			0.654	0.216		
CLERTECH			0.557	0.215		
Media – HIMEDFRQ			1.125	0.180		
MDMEDFRQ			1.116	0.240		
N	2129		1678		1678	
Log Likelihood	-3757.33		-2499.5		-2509.9	
Chi-square	203.01		328.48		260.47	
D.F	17		25		17	

~ significant at p<.1, \* significant at p<.05, \*\* significant at p<.01, \*\*\* significant at p<.001

† Reference categories and description of all variables can be found in Table 3

**Table 5: Relationship between socialization influences and age at first birth: An analysis of females 15-24 years of age with a partner in the 1986 Brazil DHS using a Cox proportional hazards model**

Variable†	Model I		Model II		Model III	
	Primary only Hazard Ratio	S.E.	W/ Secondary Hazard Ratio	S.E.	Reverse Stepwise Hazard Ratio	S.E.
<b>Primary Influences</b>						
HOUSESIZE	1.131***	0.038	1.094**	0.030	1.093**	0.034
TOILET	1.310	0.340	0.981	0.222	0.963	0.240
HISES	0.767	0.408	2.308	1.288	2.468	0.550
MEDHISES	0.654	0.203	0.933	0.326	1.032	0.313
MEDLOSES	0.886	0.210	1.298	0.360	1.365	0.273
>=1PARENT	0.808	0.247	1.112	0.369	1.212	0.318
NORTHNE	1.322	0.545	1.148	0.434	1.292	0.420
CENTRAL	0.966	0.417	1.021	0.399	1.129	0.421
SOUTH	0.816	0.337	0.916	0.343	1.061	0.413
TOWN	1.086	0.258	0.821	0.188	0.818	0.224
RURAL	2.089**	0.543	0.921	0.249	0.857	0.283
RES1COMM	1.644~	0.471	1.427	0.375	1.391	0.275
MEDEDUC	1.320	0.407	1.439	0.356	1.450	0.232
HIEDUC	0.657	0.203	0.905	0.306	0.933	0.329
MARRIED						
AGE1SEX	0.904*	0.037	0.633***	0.037	0.642***	0.057
AGE	0.655***	0.037	0.932	0.042	0.292~	0.044
<b>Secondary Influences</b>						
Religion – CATHOLIC			1.345	0.490		
EVANPROT			1.039	0.486		
HIRELIG			0.971	0.213		
MEDRELIG			0.919	0.138		
Partner – PARTMEDUC			1.101	0.342	1.153	0.312
PARTHIEDUC			0.590	0.218	0.633	0.363
PARTSKILL			0.642**	0.097	0.635**	0.149
PARTSERV			0.389**	0.115	0.410**	0.329
PARTTECH			1.130	0.206	1.203	0.176
Work – SKILL			0.364*	0.148	0.361*	0.407
CLERTECH			0.484~	0.210	0.482	0.454
Media – HIMEDFRQ			1.389	0.300		
MDMEDFRQ			1.115	0.242		
N	744		497		497	
Log Likelihood	-3210.51		-1910.88		-1913.42	
Chi-square	160.32		329.05		185.4	
D.F	16		29		23	

~ significant at p<.1, \* significant at p<.05, \*\* significant at p<.01, \*\*\* significant at p<.001

† Reference categories and description of all variables can be found in Table 3



**Table 6: Relationship between socialization influences and age at first birth: An analysis of all females 15-24 years of age in the 1996 Brazil DHS using a Cox proportional hazards model**

Variable†	I		II		III	
	Primary only Hazard Ratio	S.E.	Primary & Secondary Hazard Ratio	S.E.	Reverse Stepwise Hazard Ratio	S.E.
<b>Primary Influences</b>						
HOUSESIZE	1.176***	0.021	1.175***	0.020	1.172***	0.017
TOILET	1.106	0.102	1.077	0.094	1.086	0.089
HISES	0.506**	0.108	0.568**	0.124	0.568*	0.219
MEDHISES	0.673**	0.088	0.718**	0.093	0.726*	0.133
MEDLOSES	0.810*	0.076	0.853	0.080	0.852~	0.094
>=1PARENT	0.959	0.054	0.969	0.055	0.971	0.057
SIBLING	0.824**	0.029	0.833***	0.027	0.830***	0.034
NORTHNE	0.866	0.098	0.859	0.092	0.871	0.111
CENTRAL	0.939	0.111	0.956	0.106	0.954	0.115
SOUTH	0.961	0.126	0.972	0.127	0.968	0.131
WHITE	1.005	0.080	0.971	0.075	0.994	0.079
CITY	1.135	0.115	1.113	0.111	1.128	0.100
TOWN	1.191*	0.124	1.147	0.119	1.150	0.104
RURAL	1.369**	0.140	1.267*	0.130	1.275*	0.102
RES1COMM	1.073	0.081	1.106	0.083	1.095	0.076
MEDEDUC	0.877	0.080	0.955	0.087	0.975	0.095
HIEDUC	0.659***	0.077	0.669**	0.078	0.698**	0.117
MARRIED	6.866***	0.774	5.832***	0.696	5.928***	0.119
PRNTCOMM	0.946	0.140	0.909	0.141	0.944	0.155
AGE1SEX	0.749***	0.015	0.748***	0.014	0.750***	0.020
AGE	0.925***	0.015	0.913***	0.015	0.913***	0.016
<b>Secondary Influences</b>						
Religion – CATHOLIC			1.129	0.147		
EVANPROT			1.161	0.215		
HIRELIG			0.836*	0.071	0.848*	0.083
MEDRELIG			1.013	0.089	1.023	0.089
Peers – PEERCOMM			1.135	0.094		
Partner – PARTCOMM			1.094	0.133		
School – INSCHOOL			0.606***	0.064	0.630***	0.105
Work – SKILL			0.815~	0.095		
CLERSERV			0.939	0.069		
Media – HIMDFRQ			0.841~	0.085	0.851~	0.094
MEDMDFRQ			1.029	0.083	1.035	0.083
HIMASSMD			0.979	0.093		
MDMASSMD			1.032	0.085		
HIPRINT			1.164	0.150		
MEDPRINT			0.997	0.088		
N	4475		4449		4449	
Log Likelihood	-8719.78		-8646.48		-8653.57	
Chi-square	1331.59		1657.83		1484.33	
D.F	21		36		26	

~ significant at p<.1, \* significant at p<.05, \*\* significant at p<.01, \*\*\* significant at p<.001

† Reference categories and description of all variables can be found in Table 3

**Table 7: Relationship between socialization influences and age at first birth: An analysis of females 15-24 years of age with a partner in the 1996 Brazil DHS using a Cox proportional hazards model**

Variable	Model I		Model II		Model III	
	Primary only Hazard Ratio	S.E.	Primary & Secondary Hazard Ratio	S.E.	Reverse Stepwise Hazard Ratio	S.E.
<b>Primary Influences</b>						
HOUSESIZE	1.151***	0.022	1.158***	0.021	1.157***	0.018
TOILET	1.112	0.105	1.102	0.103	1.103	0.094
HISES	0.556**	0.122	0.622**	0.126	0.595*	0.204
MEDHISES	0.685**	0.087	0.698**	0.092	0.683**	0.126
MEDLOSES	0.807**	0.075	0.816**	0.079	0.808*	0.091
>=1PARENT	1.002	0.065	0.983	0.063	0.983	0.064
SIBLING	0.834***	0.038	0.849***	0.036	0.837***	0.044
NORTHNE	0.866	0.096	0.818**	0.085	0.844	0.105
CENTRAL	0.921	0.113	0.908	0.104	0.934	0.118
SOUTH	0.920	0.119	0.927	0.123	0.952	0.130
WHITE	1.020	0.077	0.958	0.071	0.967	0.075
CITY	1.093	0.115	1.062	0.110	1.081	0.101
TOWN	1.183	0.124	1.165	0.121	1.223**	0.099
RURAL	1.370**	0.136	1.360**	0.150	1.450***	0.103
RES1COMM	1.120	0.085	1.149~	0.087	1.112	0.075
MEDEDUC	0.941	0.088	0.942	0.090	0.877	0.094
HIEDUC	0.726**	0.085	0.736*	0.094	0.667**	0.124
PRNTCOMM	1.005	0.162	0.988	0.164	0.954	0.167
AGE1SEX	0.783***	0.017	0.777***	0.016	0.779***	0.020
AGE	0.896***	0.016	0.893***	0.015	0.895***	0.018
<b>Secondary Influences</b>						
Religion – CATHOLIC			1.140	0.155		
EVANPROT			1.342	0.245		
HIRELIG			0.932	0.079		
MEDRELIG			1.136	0.098		
Peers – PEERCOMM			1.221*	0.100	1.196*	0.084
Partner – PARTCOMM			1.179	0.150		
PARTMEDED			1.002	0.092		
PARTHIED			0.866	0.127		
PARTSKILL			0.761~	0.107	0.779~	0.141
PARTSERV			1.003	0.093	1.013	0.091
PARTTECH			0.852	0.094	0.837	0.110
AGEGAP			1.035	0.074		
School – INSCHOOL			0.925	0.106		
Work – SKILL			0.709**	0.088	0.707**	0.127
CLERSERV			0.886	0.066	0.887	0.073
Media – HIMDFRQ			0.869	0.094		
MEDMDFRQ			1.018	0.087		
HIMASSMD			0.978	0.092		
MDMASSMD			1.003	0.083		
HIPRINT			1.087	0.142		
MEDPRINT			0.948	0.083		
N	1406		1391		1391	
Log Likelihood	-6918.41		-6810.84		-6820.25	
Chi-square	456		618.62		570.57	
D.F	20		41		26	

~ significant at p<.1, \* significant at p<.05, \*\* significant at p<.01, \*\*\* significant at p<.001

† Reference categories and description of all variables can be found in Table 3

**Table 8: Relationship between socialization influences and age at first birth: An analysis of females 15-24 years of age living with one or both parents in the 1996 Brazil DHS using a Cox proportional hazards model**

Variable†	I		II		III	
	Primary only Hazard Ratio	S.E.	Primary & Secondary Hazard Ratio	S.E.	Reverse Stepwise Hazard Ratio	S.E.
<b>Primary Influences</b>						
HOUSESIZE	1.285***	0.037	1.301***	0.039	1.291***	0.029
TOILET	0.948	0.133	0.956	0.122	0.909	0.132
HISES	0.401*	0.163	0.334**	0.138	0.384*	0.433
MEDHISES	0.879	0.225	0.707	0.186	0.836	0.271
MEDLOSES	0.938	0.177	0.815	0.165	0.910	0.211
SIBLING	0.734***	0.033	0.717***	0.034	0.725***	0.047
NORTHNE	0.827	0.169	0.872	0.182	0.886	0.208
CENTRAL	0.837	0.195	0.924	0.200	0.909	0.219
SOUTH	0.920	0.201	0.906	0.202	0.908	0.217
WHITE	0.884	0.130	0.896	0.129	0.913	0.141
CITY	1.345~	0.222	1.378~	0.227	1.364~	0.161
TOWN	1.237	0.211	1.176	0.206	1.183	0.177
RURAL	1.398~	0.280	1.374	0.302	1.362	0.220
RES1COMM	0.714*	0.099	0.709**	0.096	0.729*	0.138
MEDEDUC	0.809	0.132	1.003	0.151	1.030	0.152
HIEDUC	0.547**	0.124	0.548**	0.120	0.567**	0.218
MARRIED	4.962***	0.801	4.206***	0.691	4.072***	0.166
PRNTCOMM	1.088	0.249	1.108	0.266	1.127	0.239
AGE1SEX	0.679***	0.021	0.679***	0.021	0.678***	0.031
AGE	0.909**	0.027	0.865***	0.026	0.872***	0.030
<b>Secondary Influences</b>						
Religion – CATHOLIC			1.053	0.266		
EVANPROT			0.795	0.239		
HIRELIG			0.631**	0.098	0.605**	0.147
MEDRELIG			0.905	0.121	0.944	0.133
Peers – PEERCOMM			1.088	0.160		
Partner – PARTCOMM			0.736	0.251		
School – INSCHOOL			0.436***	0.072	0.451***	0.164
Work – SKILL			0.952	0.161		
CLERSERV			1.083	0.139		
Media – HIMDFRQ			1.267	0.219		
MEDMDFRQ			1.379~	0.241		
HIMASSMD			0.939	0.165		
MDMASSMD			1.212	0.197		
HIPRINT			1.332	0.266	1.428*	0.170
MEDPRINT			1.034	0.179	1.101	0.153
N	2896		2879		2879	
Log Likelihood	-2356.06		-2311.57		-2317.27	
Chi-square	889.39		1055.4		919.08	
D.F	20		35		25	

~ significant at  $p < .1$ , \* significant at  $p < .05$ , \*\* significant at  $p < .01$ , \*\*\* significant at  $p < .001$

† Reference categories and description of all variables can be found in Table 3

**Table 9: Relationship between socialization influences and age at first birth: An analysis of females 15-24 years of age with a partner and living with one or both parents in the 1996 Brazil DHS using a Cox proportional hazards model**

Variable†	I		II		III	
	Primary only Hazard Ratio	S.E.	Primary & Secondary Hazard Ratio	S.E.	Reverse Stepwise Hazard Ratio	S.E.
<b>Primary Influences</b>						
HOUSESIZE	1.234***	0.043	1.243***	0.045	1.250***	0.034
TOILET	1.095	0.204	1.232	0.220	1.201	0.181
HISES	0.571~	0.264	0.506	0.243	0.399~	0.486
MEDHISES	0.934	0.272	0.709	0.219	0.715	0.293
MEDLOSES	0.937	0.189	0.769	0.172	0.795	0.211
>=1PARENT						
SIBLING	0.786***	0.043	0.776***	0.046	0.763***	0.058
NORTHNE	0.893	0.217	0.979	0.233	0.895	0.228
CENTRAL	0.800	0.231	0.836	0.219	0.785	0.279
SOUTH	0.825	0.241	0.808	0.260	0.765	0.303
WHITE	0.956	0.160	0.927	0.150	0.981	0.161
CITY	1.460~	0.283	1.482~	0.311	1.435~	0.196
TOWN	1.473~	0.303	1.530*	0.331	1.480~	0.202
RURAL	1.508~	0.348	1.874*	0.467	1.567~	0.241
RES1COMM	0.913	0.140	0.890	0.150	0.921	0.164
MEDEDUC	1.190	0.221	1.246	0.239	1.267	0.184
HIEDUC	0.823	0.204	0.764	0.218	0.804	0.264
MARRIED						
PRNTCOMM	1.321	0.363	1.231	0.354	1.276	0.264
AGE1SEX	0.759***	0.032	0.756***	0.031	0.754***	0.041
AGE	0.811***	0.030	0.807***	0.030	0.806***	0.036
<b>Secondary Influences</b>						
Religion – CATHOLIC			1.130	0.348		
EVANPROT			1.200	0.486		
HIRELIG			0.850	0.149	0.858	0.158
MEDRELIG			1.173	0.195	1.225	0.156
Peers – PEERCOMM			1.146	0.204		
Partner – PARTCOMM			1.209	0.603		
PARTMEDED			1.003	0.175		
PARTHIED			0.768	0.201		
PARTSKILL			0.744	0.214		
PARTSERV			0.878	0.162		
PARTTECH			0.715	0.170		
AGEGAP			1.037	0.155		
School – INSCHOOL			0.884	0.170		
Work – SKILL			0.872	0.171		
CLERSERV			0.979	0.165		
Media – HIMDFRQ			1.648*	0.345	1.641*	0.193
MEDMDFRQ			1.615*	0.338	1.590*	0.206
HIMASSMD			0.868	0.183		
MDMASSMD			1.175	0.233		
HIPRINT			1.180	0.299		
MEDPRINT			1.035	0.201		
N	316		313		313	
Log Likelihood	-1146.42		-1127.09		-1130.45	
Chi-square	182.3		277.51		226.92	
D.F	19		40		25	

~ significant at p<.1, \* significant at p<.05, \*\* significant at p<.01, \*\*\* significant at p<.001

† Reference categories and description of all variables can be found in Table 3

**Table 10: Log Likelihood Test Statistics for Comparison of Model I (restricted/only primary socialization influences) with Model II (unrestricted/both primary and secondary socialization influences)**

<b>Age at first birth</b>	<b>Total Sample</b>	<b>w/ Partner</b>	<b>w/ Parents</b>	<b>w/ Partner &amp; Parent</b>
1986				
Chi-square	2515.66	2599.26		
D.F.	8	13		
Critical chi-square	15.5	22.4		
p-value	0.000	0.000		
1996				
Chi-square	146.6	215.14	88.99	38.66
D.F.	15	21	15	21
Critical chi-square	25	32.7	25	32.7
p-value	0.000	0.000	0.000	0.009

**Table 11: Relationship between socialization influences and age at first birth among adolescents 15-24 years of age: A hazards model using only variables available in both 1986 & 1996 Brazil DHS**

1986 & 1996 Brazil DHS Socialization Influences†	Age at first birth		Age at first birth	
	1986	1996	1986	1996
	Total Sample Hazard Ratio	Total Sample Hazard Ratio	w/Partner Hazard Ratio	w/ Partner Hazard Ratio
<b>Primary Influences</b>				
HOUSESIZE	1.079***	1.058***	1.097***	1.067***
TOILET	0.889	1.116	0.988	1.110
HISES	1.454	0.713*	2.276	0.708*
MEDHISES	1.256	0.784*	0.922	0.808*
MEDLOSES	1.522*	0.880	1.292	0.908
NORTHNE	1.339	0.836*	1.136	0.863~
CENTRAL	1.065	0.890	1.017	0.887
SOUTH	0.942	1.046	0.908	0.890
TOWN	0.824	1.067	0.823	1.126~
RURAL	1.055	1.035	0.921	1.261**
RES1COMM	1.171	0.950	1.426	1.062
MEDEDUC	1.263	0.871~	1.445	0.923
HIEDUC	0.810	0.935	0.925	0.841
MARRIED	29.883***	3.093***		
AGE1SEX	0.672***	0.744***	0.634***	0.807***
AGE	0.931	0.762***	0.932	0.784***
<b>Secondary Influences</b>				
Religion – CATHOLIC	1.203	1.100	1.351	1.151
EVANPROT	0.955	1.083	1.031	1.325~
HIRELIG	1.002	0.841**	0.969	0.980
MEDRELIG	0.829	0.971	0.919	1.104
Partner – PARTMEDUC			1.091	1.056
PARTHIEDUC			0.580	0.944
PARTSKILL			0.640**	0.825~
PARTSERV			0.391*	1.000
PARTTECH			1.126	0.942
Work – SKILL	0.657	0.978	0.368*	0.840~
CLERSERV	0.561	1.069	0.482~	0.953
Media – HIMEDFRQ	1.119	0.846*	1.394	0.863~
MDMEDFRQ	1.121	0.981	1.119	1.028
<b>N</b>	1678	4460	497	1398
<b>Log Likelihood</b>	-2505.96	-15122.397	-1910.926	-8543.11
<b>Chi-square</b>	317.09	2479.58	325.71	1326.71
<b>D.F</b>	24	24	28	28

~ significant at p<.1, \* significant at p<.05, \*\* significant at p<.01, \*\*\* significant at p<.001

† Reference categories and description of all variables can be found in Table 3

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## Appendix A

### Variables and their Definitions

Variables	Operationalization
	<i>Dependent Variables</i>
AGE1SEX	=1 if woman has ever had sexual intercourse; else=0
AGEBIRTH	=1 if woman has ever had live/stillborn birth; else=0
<b>Primary Socialization Influences</b>	<i>Explanatory Variables</i>
<b>Individual</b>	
Age	
AGE	Binary variable for each year of age between 15-24
Ethnicity	
WHITE	=1 if White; else=0
MIXED*	=1 if mixed, Black, Asian, Indian; else=0
Region	
NORTHNE	=1 if living in Acre, Amapa, Amazonas, Para, Rondonia, Roraima, Tocantins, Alagoas, Bahia, Ceara, Maranhao, Paraiba, Pernambuco, Piaui, Rio Grande do Norte, Sergipe; else=0
RIOSAO*	=1 if living in Espirito Santo, Minas Gerais, Rio de Janeiro & Sao Paulo; else=0
SOUTH	=1 if living in Parana, Rio Grande do Sul & Santa Catarina; else=0
CENTRAL	=1 if living in Federal District, Goias, Mato Grosso, Mato Grosso do Sul
Place of residence	
CAPITAL*	=1 if currently living in state capital; else=0
CITY	=1 if currently living in large city; else=0
TOWN	=1 if currently living in town; else=0
RURAL	=1 if currently living in rural area; else=0
Time in place of residence	Years lived in current place of residence
RES2COMM	=1 if lived in current place <=10 years; else=0
RES1COMM*	=1 if lived in current place >10 years; else=0
Education	Level of education completed
LOWEDUC*	=1 if no education or incomplete 1° educ.; else=0
MEDEDUC	=1 if complete 1° or incomplete 2° educ.; else=0
HIEDUC	=1 if completed secondary school or higher; else=0
MARRIED	=1 if currently married/living together; else=0
<b>Family</b>	
Household wealth	Index composed of 6 household assets, including Flush toilet, radio, car, TV, washing machine, vacuum cleaner
LOWSES*	=1 if 0 assets; else=0
MEDLOWSES	=1 if 1-2 assets; else=0
MEDHISES	=1 if 3-4 assets; else=0
HISES	=1 if >5 assets; else=0

## Variables and their Definitions

Variables	Operationalization
<i>Explanatory Variables</i>	
Household structure	
2PARENT*	=1 if living with 2 parents; else=0
1PARENT	=1 if living with either mother or father; else=0
OPARENT	=1 if living with neither mother nor father; else=0
SIBLING	Total number of brothers/sisters living in household Continuous variable for 1,2,3...siblings
HOUSESIZE	Total number of males & females in household Continuous variable for 1,2,3...people in household
TOILET	=1 if flush toilet present in household
PRNTCOMM	=1 if communicated with either mother or father about family planning; else=0
<b>Secondary Socialization Influences</b>	
<b>Religion</b>	
Affiliation	
CATHOLIC	=1 if Roman Catholic; else=0
EVANPROT	=1 if Evangelical, Protestant; else=0
SPIRITOTH*	=1 if Spiritist, Kardecist, Umbanda, Candomble or if other religion, i.e. Eastern, Jewish; else=0
Frequency of attendance	
HIRELIG	=1 if attends once a week; else=0
MEDRELIG	=1 if attends 1-2 times/month; else=0
LOWRELIG	=1 if <1 time/month or never; else=0
<b>Peers</b>	
PEERCOMM	=1 if talked with peers about FP; else=0
<b>Partner</b>	
AGEGAP	=1 if partner is >5 years older or younger; else=0
Education	
PARTLOEDUC*	Level of education completed =1 if no education or incomplete 1° educ.; else=0
PARTMEDUC	=1 if complete 1° or incomplete 2° educ.; else=0
PARTHIEDUC	=1 if completed secondary school or higher; else=0
Employment	
PARTNOWORK*	Type of current employment =1 if not working; unskilled manual/agric; else=0
PARTSKILL	=1 if skilled manual/household/domestic; else=0
PARTSERVF	=1 if clerical, sales, services work; else=0
PARTTECH	=1 if self-employed professional, technical, management work; else=0
Communication with partner	
PARTCOMM	=1 if talked with partner about FP or advised partner she had STD; else=0

Variables and their Definitions

Variables	Operationalization
<i>Explanatory Variables</i>	
<b>School</b>	
INSCHOOL	=1 if currently attending school; else=0
<b>Employment</b>	
NOWORK*	=1 if not working; unskilled manual/agric; else=0
SKILL	=1 if skilled manual/household/domestic; else=0
CLERSERV	=1 if clerical, sales, services work; else=0
PROFTECH	=1 if self-employed, professional, technical, management work; else=0
<b>Media</b>	
FP exposure in print media	FP exposure in newspaper, poster or brochure
NOPRINT*	=1 if no exposure; else=0
MEDPRINT	=1 if exposure in 1-2 media; else=0
HIPRINT	=1 if exposure in 3 media; else=0
FP exposure in mass media	FP exposure on radio and/or television
LOMASSMD*	=1 if no exposure; else=0
MEDMASSMD	=1 if exposed to FP on either radio or TV; else=0
HIMASSMD	=1 if exposed to FP on radio and TV; else=0
Frequency of media exposure	Listens to radio every day, reads newspaper at least once a week, watches TV at least once a week
LOMEDFRQ*	=1 if does one of the above; else=0
MEDMEDFRQ	=1 if does two of the above; else=0
HIMEDFRQ	=1 if does all three of the above; else=0

## APPENDIX B

### Variables and their Availability in 1986 & 1996 DHS

Variables	1986 DHS	1996 DHS
Initiation of sexual activity	✓	✓
First birth	✓	✓
<b>Primary Socialization Influences</b>		
<b>Individual</b>		
Age (years)	✓	✓
Ethnicity	NA	✓
Region	✓	✓
Place of residence	✓	✓
Capital	NA	
Large city		
Town		
Rural		
Time in place of residence	✓	✓
Education	✓	✓
Marital Status	✓	✓
<b>Family</b>		
Household wealth	✓	✓
Household structure	NA	✓
Living with both parents*	(only head of	
Living with one parent	household	
Living with no parent	identified	
Number of siblings	NA	✓
Size of household	✓	✓
Mother's education	NA	✓
	only available if	
	head of household	
	is mother	
Father's education	NA	✓
	only available if	
	head of household	
	is father	
Communication with parents	NA	✓

**Variables and their Availability in 1986 & 1996 DHS**

<b>Variables</b>	<b>1986 DHS</b>	<b>1996 DHS</b>
<b>Secondary Socialization Influences</b>		
<b>Religion</b>		
Affiliation	✓	✓
Frequency of attendance	✓	✓
<b>Peers</b>		
Communication with peers	NA	✓
<b>Partner</b>		
Age	NA	✓
Education	✓ (current partner)	✓
Employment	✓	✓
Communication with partner	NA	✓
<b>School</b>		
Currently attending school	NA	✓
<b>Employment</b>		
Current type of work	✓	✓
<b>Media</b>		
FP exposure in print media	NA	✓
FP exposure in mass media	NA	✓
Frequency of media exposure	✓	✓

✓ = available  
 NA = not available

