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**DIVERSITY OF CHILDBEARING BEHAVIOUR WITHIN POPULATION IN THE CONTEXT OF  
BELOW REPLACEMENT FERTILITY IN BRAZIL\***

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\* The views expressed in the paper do not imply the expressions of any opinion on the part of the United Nations Secretariat.

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# Diversity of childbearing behaviour within population in the context of below replacement fertility in Brazil

## Abstract

Brazil, the largest Latin American country, has reached below replacement fertility in the 2000's for the countries' average, and fertility continues decreasing currently. The diversity in the level of fertility is still present, since some socioeconomic groups have fertility little above one child per women and others still have fertility above three, which is not different from many other countries. Nonetheless, while in most low fertility countries a delay in childbearing occurred as fertility rates decreased, shifting the mode of the fertility curve to high age groups, in Brazil there is an increasing rejuvenation of the fertility schedule. The objective of this paper is to investigate whether the timing of childbearing in Brazil has the same pattern: having fewer children and having them early, for several socioeconomic groups, in order to predict the path of fertility in the future in Brazil, and to shed some light on why and how the fertility schedule is so different from other low fertility experiences. Amongst others, this is important for making inferences about population growth in the coming years, since generations will replace themselves very quickly given the current pattern.

## A. INTRODUCTION

Several Latin American countries have reached below replacement fertility, if not in terms of the country average, at least for the large socioeconomic or regional groups within the country. Brazil, the largest of these countries<sup>1</sup>, already has below replacement fertility, as demonstrated by a variety of data sources. The 2007 National Annual Household Survey (*PNAD*) gives an estimate of 1.96 children per woman. The recently released DHS (*PNSD* 2006) showed fertility at 1.8 children per woman. Hence, we might easily conclude that Brazil is following the path of Mediterranean countries like Italy, Spain and Portugal. Indeed, by looking at the pace of continuous decline that we have observed, the quantum of fertility in Brazil will probably reach the lowest-low fertility of those countries in the near future (Lesthaeghe and Willems, 1999; Kohler, Billari, and Ortega, 2002). However, history does not repeat itself when comparing Latin American and European countries. One of the biggest differences we can point to is the timing of childbearing.

While in the low fertility countries in Europe a delay in childbearing has taken place, shifting the mode of the fertility curve to high age groups, in Brazil there has been an increasing rejuvenation of the fertility schedule (fertility rejuvenation) as fertility rates fall. Also, the decline in fertility in Brazil has occurred mainly by stopping and not by spacing births throughout the reproductive life. Moreover, the mode of current fertility is among women aged 20-24 and in the last few decades there has been a tendency towards an increase in adolescent fertility. The objective of this paper is to investigate whether the timing of childbearing in Brazil has the same pattern of having fewer children and having them earlier for several socioeconomic groups, in order to predict the path of fertility in the future in Brazil, and to understand why and how fertility structure is so different from other low fertility experiences. This exercise is very important in defining how population growth will unfold in the coming years, since the generations replace themselves so quickly, and in defining the consequences of this pattern on increasing development and reducing economic and social inequality.

## B. BACKGROUND

In the not too distant past, studies in the country were proposing hypotheses to explain why fertility was high (Paiva, 1985). Up until the 1980's, the predominant stance among Brazilian demographers was that, firstly, there was not, in general, a demand for contraception, and secondly that the pace of population growth and its volume were neutral from the perspective of social welfare. Nonetheless, these views became outdated as the process of demographic transition in the country moved forward, and it became increasingly clear that women in the poorest social strata needed better information and adequate access to regulate their fertility (Carvalho and Brito, 2005).

In less than 30 years, TFR has fallen to unforeseen levels. Berquó and Cavenaghi (2005) show that only 4.7% of women had fertility regimes with an average number of children of five or more, 37.5% had between 2.1 and 4.9 children, and 57.7% had reached below replacement fertility regimes by 2003. Lately we have seen that the number of childless mothers and fathers and the number of one-child parents are on the increase in Brazil. In 1996, 8.8% of women were at the end of their reproductive life (45-49) without having had children and by 2006 this estimate climbs to 13.4%. Also, there were 7.7% of women aged 45-49 with only one child and the estimate 10 years later was 14.3%. This tendency is similar to what has happened in other countries with low fertility regimes (Breton and Prioux, 2008, Rosero et al, 2009).

Although fertility is very low, there is still room for a large percentage of unwanted or mistimed pregnancies. According to the 2006 *PNDS*, 54% of births were planned for the moment of pregnancy, 28% had been planned for later (mistimed) and 18% were unwanted (Berquó et al, 2008). These figures show that, given efficient contraceptive use, both the timing and level of fertility in Brazil would have been different from that which has actually been observed. Nonetheless, the concept of efficient contraception is an idea that still requires a great deal of study because it depends not only on the contraceptive characteristics, but also depends heavily on the context in which the contraception takes place. For example, given non-stable relationships, situations of significant gender inequality and several other constraints on usage, the inconsistent use of contraception may play a large role in the rates of contraceptive failure, facts that might be responsible for a great many mistimed and unwanted pregnancies.

## C. DATA AND METHODS

Data on recent fertility are available from several sources in Brazil; however, to be able to carry out a detailed analysis by different socio-economic groups, the most suitable source is the demographic census, which has a long questionnaire applied to a large sample (around 12.5% on average), including fertility questions. Hence, for an initial analysis, we have used the 2000 Demographic Census Data. Additionally, to provide more recent information, we have used the 2007 National Annual Household Survey (*PNAD*) for more aggregated analyses, and the Demographic and Health Survey (*PNDS*) has been used to obtain data on the age of initiation of childbearing and other indicators of timing in reproduction. The data from the first two sources relate to all live births and children born in the year preceding the census date. The methods used to calculate age-specific fertility rates (ASFR) and the total fertility rate (TFR) in these sources are indirect techniques based on parity and current fertility, and for this paper we selected the Brass P/F ratio technique (United Nations, 1983).

An important mention has to be made regarding the socioeconomic variables used in this paper. Literature points to larger socioeconomic differentials in fertility in Latin America, and Brazil is no exception, though in recent years the differentials have been narrowing as fertility falls. Since large population segments still present more than three births per woman on average, we elected to analyze socioeconomic groups in this paper and based the analysis on income distribution and women's education. We are aware that both variables have compositional effects on TFR estimates, but as both income and education have

shown an improvement in recent years in Brazil, the estimates we find may be biased on the low side, in other words the TFR would be even lower for the upper income and educational groups if no improvement were seen in these two areas. For income, we selected a relative categorization based on the quartile distribution of per capita household income, divided into three groups: 1) the first quartile representing the lowest 25% of the income class, 2) the second and third representing the middle income class, 3) the last quartile defined the upper income class. It is important to mention that the classification was performed at the household level and all women aged 15-49 living in the same household are included in the same category. As for education, the most comparable variable in the case of Brazil is completed years of schooling<sup>2</sup>, and the system is divided into basic schooling, 1-8 years of complete education<sup>3</sup>, high school from 9 to 11 years and 12 or more relates to those beginning college education and higher. Since in the last 10 to 15 years there has been a tremendous improvement in school achievement, primarily basic school education, and also because young fertility is very high in Brazil, we decided to use only two categories of education: 0-8 years and 9 or more years of education.

As regards the 2006 Brazilian demographic health survey (*PNDS 2006*), it is important to mention that, as in all other demography health surveys worldwide which collect information on birth history, the *PNDS* finds total fertility rates to be lower than those estimated by indirect methods (Alkema, et al, 2009). Hence, the data for the *PNAD 2007* and *PNDS 2006* show different levels of fertility at the national level, 1.96 and 1.8 children per woman, respectively. The idea is not to compare these data or evaluate the best estimates (both are probably some way off the actual rates), but to use both sets of data to evaluate the type of data provided by each. Using a little caution, the *PNAD* permits the disaggregation of data in different social groups and the *PNDS* provides more information on the story behind reproductive histories. In addition, it is important to point out that socio-economic groups in the *PNDS* are not directly calculated from the household member's earnings, but rather from a methodology that creates an estimate of socio-economic groups from the possession of appliances, cars, maids living in the household, and the education of the head of the household (Cavenaghi, 2009).

#### D. FERTILITY TRENDS AND PATTERNS

The Census and the data from the *PNAD*<sup>4</sup> confirm the decrease in the level of fertility between 1980 and 2007 (Figure I). The rise in the level of fertility seen during the 1980's was remarkable as was the even higher concentration of births at younger ages observed during this big fall in fertility rates, changing fertility age-pattern as well. The next decade, the 1990's, did not follow the same trend in respect of the fall in age-specific fertility levels, presenting an overall decline of only about 0.3 children per woman, thus much less pronounced than in the previous decade. On the other hand, an even higher concentration of births at younger ages was observed, visibly changing the shape of the fertility curve, due to a continuous decrease in the rates for women above the age of 30, a very small decline, almost stalling for those aged 20-24, and an increase for those below 20 years old<sup>5</sup>. Data for the current decade, from the National Household Survey, again shows a large fall, as was seen in the 1980's, for women aged 20-24, and a smaller fall for all other age groups, including adolescents. In broad terms, we may state that fertility rates have always decreased for all women aged 20 or over, but were somewhat unstable for women aged 15-19, showing an increase at first, from around 80 to 94 children per one hundred women during the period 1980-2000, and in the current decade showing a small decrease, reaching an ASFR of 76 in 2007. Clearly both factors, having fewer children and having them earlier in life, is the most striking feature of Brazilian reproductive behaviour.

[Figure I]

By comparing Brazilian rates with some European countries we see two different, overall patterns (Figure II), an earlier fertility pattern and a later one. The timing and level of fertility for those with Latin origins

are similar to those in Brazil only for ages 30 and over, but the rates for Brazil are lower than in all other countries in the chart. On the other hand, all the fertility rates for ages 15 to 29, although still decreasing in recent years, are higher in Brazil. The fertility rate for women aged 15-19 is close to zero in these developed countries, while in Brazil we observe a rate of around 80 children for every thousand women. Every thousand women aged 20-24 have fewer than 50 children in the countries of Latin origin and in Brazil they have the highest rates among all ages, above 100 children per thousand women. Hence, we can state that the differences in the TFR among these countries are mainly due to the timing of childbearing for younger women.

[Figure II]

A fairer assessment can be made by comparing Brazil and France, since they have the same level of total fertility, around 1.9 children per woman. Although France has the same level of fertility, it has a very big difference in terms of timing. In France, few younger women are becoming mothers, motherhood being concentrated between the ages of 25 and 34. After the age of 35, most fertility in France is as low as in all the other countries of Latin origin shown in figure II. Contrasting these two different schedules, we can get an idea about what could happen to Brazilian TFR in the next few years. One possible course that Brazilian women could soon follow would be to decrease adolescent and youth fertility (15-24) by termination, i.e., not just postponing and having them later. If this is the case, Brazil will have a lowest-low fertility like Italy, Portugal and Spain, and indeed, studies have shown that there is already a tendency towards decreasing fertility in the 15-19 age bracket (Cavenaghi and Berquó, 2005), and the period rates for women over 25 have still not shown an increase in recent years. Another possible course could be that younger women would only postpone childbearing, ending up having children at older ages, following France's lead, which would maintain current levels of fertility (changing period TFR but not cohort TRF). Amongst others, a potential third course could be that Brazil has already reached the nadir of fertility in each age group and that no change in the timing of fertility would occur, maybe with some variation around 2 children per woman, as in the case of the United States of America (Preston and Hartnett, 2008). To attempt to answer these questions and put forward some hypotheses on the future of Brazilian fertility, we shall look into the behavior of different socioeconomic groups over recent years.

### *1. Socioeconomic differentials in the fertility schedule*

Historically, income and years of education have an inverse relationship with fertility levels. Also, as shown in figure III for 2000 and figure IV for 2007 (both in panel A), there are different patterns in the timing of fertility according to income, where the female population is divided into three income groups, which for ease we shall call here the lower, middle and upper income classes or groups, although this is not to assume that social groups are defined by monthly earnings. Similarly, groups of years of education show not only very different levels of fertility but also different timing (Panel B of the abovementioned graphs) for both categories presented in the analysis. Despite all compositional factors that affect fertility levels, in the sense of increasing education of higher parity women, between 2000 and 2007 we can see that TFR continues to decrease for all categories, even for those groups that already presented low fertility.

By looking at the data for the year 2000, although fertility was not at below replacement level at the national level, women in the upper income group (Figure IIIA) or women with nine years or more of completed schooling (Figure IIIB) presented low TFR (less than 1.5) and had fertility age patterns closer to those of the developed countries, although still with some differences. For instance, the median age of childbearing in these groups was around 27.5 in Brazil and 30 in Italy. In these population groups, younger women had few children and presented higher fertility at ages 25-29. On the other hand, having lower education or being in the lower income group changes totally women's timing of childbearing. Adolescent fertility, for example, was more than 10 times higher for the poorest or the least educated than

the wealthier or more educated. The highest age-specific fertility rate was reached at age 20-24 if women were in the lower quartile of income or if they had less than 9 years of education (complete primary school or less).

Seven years later, TFR had decreased for all income and educational groups, but with greater intensity in the case of the former, and ASFR had changed substantially only for the middle and upper income groups, the latter reaching the lowest-low fertility level, 1.1 children per woman (Figure IV, Panel A). Data from the National Household Survey cannot be used to estimate, within a reasonable margin of error, for upper groups of education, such as, completed high school or higher, but there are indications that the pattern of fertility also changed for the very highly educated but this pattern is not repeated for women with 9 or more years of education, due to an improvement in women's education. In other words, the timing of fertility according to education is changing for the very highly educated women, not the average educated women. On the other hand, the division into social classes demonstrates important changes for women in the middle and upper income groups<sup>6</sup>.

By looking for a more multivariate behaviour by cross-classifying the population by income groups and years of schooling, we can see that fertility distribution in 2000 presented an older shape for the more educated women, regardless of income group (the mode of the fertility distribution is the age range 25-29 for all income groups if women have 9 or more years of schooling - figure III, Panel D). On the other hand, as can be observed in panel C, for the least educated (0-8 years), although the level of fertility is very different between income groups, there is not much difference in the shape of the fertility schedule, where all of them presented a very young pattern, with the highest concentration in the age range 15-24. In spite of this, when making a comparison with developed countries (see Italy as an example in the charts), even women who had attained a higher level of education did not reach those developed fertility patterns, but the combination of schooling with income is what enables a change in women's behaviour with regard to childbearing, and puts this higher educated and higher income group (9 or more years of education and in the 25% upper income class) in the situation of lowest-low fertility levels. The experience of motherhood is very much associated with life projects and perspectives. A younger woman who stays at school for a longer time and has better opportunities in the job market might not seek other traditional life projects such as marriage and childbearing. Much of the decline in fertility rates in developed countries is due to postponement of the first birth and this has had very significant consequences for demographic growth and other aspects of social life. In Brazil, the consequences of the stopping behaviour after a very early start to childbearing still have to be better understood and analyzed in terms of social behaviour as well as in terms of demographic dynamics.

The same cross-classification for the 2007 data, although the sample variations start to come into play, gives important clues concerning recent trends (Figure IV, panel C and D). For the least educated, there is a continuous decrease for all income classes, but the shape of the distribution of age-specific fertility rates did not change (with the exception of the higher income class, but this presents a lot of sampling noise). The story is much the same for the more educated group. They also presented fertility decline in this seven-year period, but income classes do change the pattern of childbearing: the poorest group presents an even higher fertility rejuvenation compared to 2000, and the middle and upper classes start to show a move towards fertility postponement. We might infer from this observation that it is the combination of better school achievement and better income that will enable a change in the fertility schedule for Brazilian women over the coming years. Moreover, a combination of high income and at least the completion of basic schooling, which corresponds to very low educational achievement, brings fertility to the lowest-low level, or even lower than lowest-low, with around only one child per woman on average.

Are the changes in fertility behaviour in specific groups sufficient to change the Brazilian fertility level and schedule in the coming years? How many women are there in each of these groups? Table 1 presents figures of population size in each segment of the population and some indicators of timing of childbearing

based on indirect measures. In Brazil in 2007, there were around 52 million women of reproductive age; over 17 million women were living in the 25% poorest households, while in the upper income group there were about 10.5 million. The two population segments that presented postponement at childbearing ages, as previously noted, namely the better educated from the upper and middle income classes, accounted for more than 22 million women and were at the lowest-low level of fertility in 2007. During these seven years, we can see that there was an enormous growth in the size of the better educated population, an increase of almost 80% in women with 9 or more years of completed schooling. Indeed growth occurs for all social strata, but with greater intensity among the middle and lower classes.

[Table 1]

The index of postponement, as defined in Lesthaeghe and Neidert (2006), namely the ratio of age-specific fertility rate of women over 30 years old to the rates for women in the 20-29 age range, reaffirms the young age pattern of fertility as analyzed previously, but more importantly it shows that the concentration of fertility in the 20-29 age range is much higher for the least educated and least wealthy population; about two thirds of births occur for women in the 20-29 age range. Important changes are observed between 2000 and 2007 in the timing of childbearing. According to 2000 data, the postponement index was only closer to that of the developed countries for the wealthier population, above 0.8, and by 2007 this same population group displays a very high index. Moreover, the better educated in the wealthiest 25% of the population even surpass the index of Italy and France. It appears as if this group of Brazilian women will track more closely the example of Spain in terms of the timing of childbearing. In addition, as previously pointed out, the combination that allows this behaviour is better education and better economic conditions. Can this scenario materialize for the majority of the population in Brazil in the near future? In order to answer this, we must at least look at other factors such as women's participation in the labour force which is highly associated with fertility levels or which may impose certain constraints in childbearing experiences.

Next, to address this topic we show, in figure V, the ASFR curves for women both in and out of the labour force, for 2000 and 2007 data. In panel A and B we can see that the status of participating or not participating in the labour market changes the timing of childbearing. Nonetheless, both groups still present a very young pattern of motherhood (index of postponement around 0.5 and mean age of childbearing around 25-26 years old – not shown). The fertility pattern changes if those groups are divided according to social strata, and again, only the wealthier women and those participating in the labour force present a later pattern of fertility experience. Looking at the 2007 figures (Panels C and D), it is clear that the level of TFR has decreased for all categories and there was a little postponement in the experience of almost all groups except for the lower income groups for those in or out of the labour force. In other words, the postponement or rejuvenation is again due to the economic situation and not due to women's participation in the labour market, which has greatly increased since 2000<sup>7</sup>. It is important to note that women in the labour force that belong to the upper income class, which are more than 8 million in 2007, present a fertility pattern closer to that of Spain but with an even lower TFR, with an average of 1.05 children per women.

## 2. *Direct measurements of the timing of childbearing: birth order and age at first birth*

Fertility decline in Brazil is widely regarded within union as stopping behaviour and not due to the spacing or postponement of births (Merrick and Berquó, 1983), and this latter feature remains true 35 years after the beginning of the decline, as we have seen above. Contrary to observations in other countries, the *tempo* effect in period-fertility rates has had a negative effect (Rios-Neto et al, 2005) on TFR estimates in Brazil. One additional feature, distinct from many other places, is that marriage in Brazil cannot be understood as legal marriage, since consensual union is very frequent and has presented growing rates in recent decades (Berquó, 2001). In addition, sexual intercourse frequently precedes union



and even more so in recent decades, and with a greater intensity among the poorer population. In this section, we present some data on reproductive histories in order to understand, at least part of the scenario that produced this much rejuvenated fertility pattern in a regime of very low levels of fertility.

Birth history data in Brazil is available from the Demographic and Health Surveys which have been carried out since 1986. In order to highlight recent trends in the timing of childbearing, we have compared data for the 1996 and 2006 surveys. The indicators selected for analysis here were age-order-specific birth-rates, estimated for the 5-year period prior to the surveys, according to women's characteristics (education and social class). Additionally, we provide some descriptive statistics on age at first intercourse, age at first marriage (union, legal or otherwise) and age at first birth for women aged 25-49 at the time of interview, for both surveys. Lastly, we present two other important markers on reproductive histories, or at least indicators that give a more complete picture in the case of Brazil, which are age at first pregnancy and age at first contraceptive use, both of which are only available in the 2006 survey.

Graphs 6, 7 and 8 present several panels with age-order-specific birth-rates for first birth, second birth and third or more births, for the national average in 1996, 2006, and according to groups of completed years of schooling and socioeconomic groups, as well as the figures for mean childbearing age for each specific order between parentheses in the series' labels<sup>8</sup>. As we can see, in 1996, the vast majority of first births occurred to women in the 15-24 age range (almost 80%), and few had their first child after the age of 30. In 2006, the rates of first birth for the 20-24 age group decreased considerably. Besides, it is interesting to see that women in the first age range presented non-zero fertility for second births (20 births for each one thousand women in 1996 and 14 in 2006). The third point to highlight in the two first panels of figure VI is that the rates for third birth or more had declined a great deal from 1996 to 2006.

If rates at the national level already tell us a lot about the timing of fertility, disaggregating this population into groups of completed years of schooling may reveal a little more (Figure VI panel C and D and Figure VII, panel A and B). Women who did not get as far as high school (0-8 years) have an even earlier pattern of fertility. Many of them started childbearing in between 15 and 19 years of age (85 women out of one thousand), a much higher level than those who had at least started high school (23 women out of one thousand), and another large proportion started between the age of 20 and 24. However, the most interesting fact is that, between 1996 and 2006, the rate of first births for the youngest women has risen to 106 births per thousand women and the subsequent age group (20-24) has almost the same rate as for first births. Birth-rates for orders three and above, even for the least educated, had decreased in the period. That is, less educated women had their children at even younger ages, but data show that they will keep fertility levels at even lower rates: the pattern for the period definitely seems to be having fewer children and having them earlier. Increasing first order births rates at the adolescent and young ages, though, was not exclusive to less educated women; however women who had at least entered high school showed an increase at a much lower level. Worthy of note is the fact that fertility at young ages showed a very small decrease for young women at the national level because of a drop in the second and third or more birth order, since first order rates remained constant in the period for women aged 15-19.

The classification of women according to social class produces almost exactly the same results as education, as far as period comparison is concerned. Lower and middle classes present more or less the same changes, although the level of fertility is much higher in the lower class, mainly for younger women. The upper class, which comprises about 25% of women, in the higher income quartile, shows a more pronounced difference than for the more educated. figure VIII (panels D and E) shows that the mode for first birth rate for the top socioeconomic group is reached at ages 25-29 and the two previous age groups have far fewer births. Nevertheless, we should point out that, even for this high economic group, the rates are not as close to zero as one might expect given the behaviour seen with women living in developed countries.

Another interesting trend can be seen in the mean childbearing age for different birth orders, also per the same graphs referred to above. Rejuvenation from 1996 to 2006, shown by the decreasing childbearing age, is due to third birth or over birth order for the country as a whole, mostly due to a stopping behaviour at later ages. By social classes though, the rejuvenation shown by this indicator is mainly due to the increasing rate of fertility at adolescent and young ages (15-19).

*a. Trends in reproductive history*

Brazil is one of the countries with the highest rates of contraceptive use in the world and has a very narrow method-mix, mostly comprising methods considered to be modern (80% of use among all women and 77% for modern method). This fact explains in part why fertility is kept to a very low level for most of the population, since the ages at first intercourse and first birth are low compared to many other countries, and should move in the direction of consequent higher fertility rates (at the time of the interview, less than 6% of women aged 15-49 had never had sexual intercourse). Several figures attract attention in table 2, for 1996 data, but above all what are noteworthy are the minimal ages of first intercourse and first union or birth. Girls, even prior to adolescence, are already having sex and some are becoming mothers, and this is not the sort of behaviour that was evident in the past, since data for 2006 (table 3A and B) shows that this currently occurs in Brazil. On the other hand, the maximum age of first intercourse show that some women engage in sexual relationships almost at the end of their reproductive lives. As a result of this wide range of behaviour, the mean (or median) age of first sexual intercourse in 1996 was about 19 years old, and it has decreased in the last ten years by about one year. Median and mean age at first union is also very low, around 20, and has not changed significantly in recent years. The timing of first birth, on average, closely follows the time of first union. Indeed, all three events in women's lives start early and take place over a short period of time. The interval of time, on average, between having first sexual intercourse and the first child is less than three years (2.8), and the timing between union and first birth is a little over one year on average. In other words, the typical pattern is to engage in marital union and have the first child immediately afterwards. One interesting way of picturing this scenario is that among all women who engage in union, 75% of them have done so before the age of 24, an age at which women in most developed countries are finishing their studies and entering the labour market.

This picture for the country as a whole is even more revealing when these same figures are observed for women in different social strata, by classifying them by years of education or socioeconomic groups as well. Women living in the poorest conditions start sexual intercourse, engage in union, and have the first child at even earlier ages. Even though there are significant differences among these social groups, the difference amongst the wealthiest and the poorest are not as large as one might expect, at least for women in classes A and B.

[Table 2]

Another important part of reproductive history can be observed from two other indicators that were collected in the most recent survey: age at first contraceptive use and age at first pregnancy. Several descriptive statistics for these indicators are presented in table 3 A and B. In light of the very high use of contraception, it should be expected that women are protecting themselves from unwanted pregnancies when starting sexual intercourse. However, as we can see, on average, women start using contraception one and a half years after the first sexual intercourse, and it is worth noting that the contraception referred to here is of any type, even the most traditional ones. This fact might explain the high percentages of unplanned births as reported by women. The gap between first use of contraception and first sexual intercourse is higher among the less well educated and among the lower socio-economic groups. Since knowledge of contraception reaches almost 100%, as reported by these women, the reasons for not immediately using them might have been related to inadequate access to contraception or constraints over the various types to use. One important piece of information is that, although a family planning law has

existed in Brazil since 1997 that guarantees access to all forms of contraception via the public health system, it is reported that women have some difficulty in accessing, free of cost, the most recommended contraception for their age and situation, mainly for those who most need them, the poorest and the youngest. In 2006, the *PNDS* data indicate that the provision of condoms, pills and other hormonal contraceptives comes mostly from drugstores (and are sold over the counter without prescription) across all social classes.

The age at first pregnancy was included in the survey due to an investigation into pregnancy history for the last 3 live births, but also with the intention of capturing data on interruption of pregnancies before the first live birth. The mean age at first pregnancy shows that it follows very closely the mean age at first union (more so among the less well educated and lower social classes), and in several cases the pregnancy precedes union. Again, for the upper class, the difference is about one year on average between pregnancy and union, but even so, these events occur over a very short period of time.

[Table 3A and B]

*b. Unwanted and mistimed fertility*

As stated before, one important piece of information to understand what will happen to the future of fertility rates in Brazil is looking at the portions of births that are wanted and those not wanted. Although the country has below fertility rate, there is still a large fraction of this fertility that is unwanted or mistimed. Both portions would cause errors in population estimates if couples would approximate wanted fertility to the observed. According to the *PNDS* 2006 report the difference among wanted and unwanted fertility has decrease last years, from 28% to 11%<sup>9</sup>, however, the level of wantedness has downward estimates according to most methods put forward, and indeed is very hard to measure its correct level, as largely documented (Bongaarts, 1990, Casterline and El-Zeini, 2007). The new methodology to measure unwanted fertility proposed by Casterline and El-Zeini (2007), and applied to most Latin America countries with data for the last 30 years, show very high unwanted estimates for Brazil. Table 4 shows some unwanted fertility estimates from various methods, extracted from Casterline and Mendonza (2009). The percentage of unwanted birth has decreased, but still around one quarter of live births are estimated to be unwanted, and according to Casterline & E-Zeini's method, one third was unwanted in 2006, when the estimates of average number of children was already 1.8. This gives, in average, more than half unwanted children in Brazil nowadays. From these estimates we can infer that if couples could control fertility as desired, then fertility rates in Brazil would be about 1.2 children per women. We believe that it is very difficult to accomplish the wanted number of children in the presence of high contraceptive failure and mainly on a system that is very gender biased. However, as women get more education and poor population have better access to contraceptive, we believe fertility rates will continue falling. As showed by Berquó and Lima (2009), the percentage of unwanted fertility is much higher among those living in rural areas, in the poorest regions, the less educated; who also are those that stated have had already more children than desired.

[Table 4]

Another important piece of fertility rate is the mistimed fertility. Although the cohort TFR would not change with variations in the level of mistimed births, the period fertility does change and can cause some fluctuations in population age structure, which is the long run also has impacts on the size of population. According to Berquó and Lima (2008), 28% of all birth occurred in the 5-years preceding the 2006 survey were stated they want to have the birth later. This figure is much higher for women below their 20's (43%) and for lower order birth (first order were stated as 35% mistimed). Hence, the younger age pattern of current fertility would not have been the same (as the level of fertility) is women would practice what they say they would like for their reproductive lives.

## E. DISCUSSION

In spite of there being a level of fertility closer to or lower than that in developed countries, Brazil still has a pattern in timing that does not reflect the development and modernization indicators that brought fertility rates down. Amongst other factors, we point out: the universalization of schooling is still very recent and only reaches basic schooling levels; women have entered the labour market in large numbers, but the majority are still in very low paid jobs and in a very gender segregated market; families have migrated from rural to urban locations or from low to high density metropolises, but most of them still live on the fringes of the cities.

Although giant strides have been made in terms of the empowerment of women and improvement of women's status in several key areas, as far as reproduction is concerned, we are still a long way from sharing the responsibilities of bringing up children equally with men. The majority of women, mainly in the low socioeconomic groups, still have life projects that are associated with forming families at young ages. The conflicts of modern life drive them into wanting lower and lower numbers of children, but at the same time, social norms and other conditions, still push them towards the traditional life of early union and childbearing. Nonetheless, the tendency is for these women who start childbearing early not to have as many children as God would want, as women would say in the past, but they would be satisfied with only one, since the experience of maternity can be accomplished with only one birth. Following this reasoning, it is very common to hear nowadays that the "number" of desired children is "one is good enough". Moreover, having at least eight years of schooling does not mean the same as it would mean in the past, when very few had achieved this grade. Hence, we believe for the short to median run this young fertility calendar will be the most common pattern for the majority of women in Brazil, thus keeping for the next 10 or 20 years at least, a much rejuvenated shape of fertility rates.

Based on the data presented by social groups and bearing in mind the limitations of the very fast decrease in economic and social inequalities, we believe that fertility in Brazil will continue its downward path in the coming years, maybe to levels comparable with those of Mediterranean countries, but with a fertility schedule that resembles that of the United States of America, which manages to keep the fertility around the replacement level. This is indeed a probable scenario, and if this materializes, the implications for population growth must be a topic of interest for policy makers and planners, since the age structure of the population will have features that are very specific for this situation. Additionally, this scenario has very high probability of occurring in a very unequal society.

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TABLE 1: CHARACTERISTICS OF THE POPULATION IN STUDY AND TIMING OF CHILDBEARING INDICATORS, ACCORDING TO INCOME GROUPS AND EDUCATION. BRAZIL, 2000 AND 2007.

Countries/year and socioeconomic groups	2000					2007				
	TFR	Women 15-49		Fertility average age	Index of Postponement	TFR	Women 15-49		Fertility average age	Index of Postponement
		abs.	(%)				abs.	(%)		
Brazil	2.60	46,242,336	(100.0)	26.4	0.52	1.96	52,908,370	(100.0)	26.5	0.57
Lower income group	4.50	12,425,994	(26.9)	26.8	0.57	3.10	17,118,824	(32.4)	26.0	0.47
Middle income group	2.22	23,330,356	(50.5)	25.9	0.45	1.72	25,223,433	(47.7)	26.7	0.59
Upper income group	1.41	10,485,986	(22.7)	27.9	0.69	1.10	10,566,113	(20.0)	29.7	1.18
0-8 years of education	3.33	30,292,406	(65.5)	26.0	0.46	3.07	25,006,852	(47.5)	25.3	0.37
9 or + years of education	1.50	15,475,126	(33.5)	27.5	0.64	1.48	27,585,480	(52.5)	27.7	0.78
<u>0-8 years of education</u>										
Lower income	4.75	11,120,916	(24.3)	26.7	0.55	3.80	11,991,064	(22.8)	25.6	0.41
Middle income	2.58	16,090,980	(35.2)	25.3	0.38	2.19	11,355,500	(21.6)	25.3	0.38
Upper income	1.67	3,080,510	(6.7)	25.9	0.37	1.61	1,660,288	(3.2)	27.0	0.35
<u>9 or + years of education</u>										
Lower income group	2.44	1,112,188	(2.4)	27.2	0.57	2.06	5,012,024	(9.5)	26.7	0.56
Middle income group	1.67	7,012,744	(15.3)	27.3	0.60	1.67	13,695,261	(26.0)	27.8	0.77
Upper income group	1.28	7,350,194	(16.1)	28.7	0.81	1.04	8,878,195	(16.9)	30.0	1.32
Portugal /2004	1.40			29.2	0.96					
Italy / 2003	1.28			30.3	1.18					
Spain / 2002	1.27			30.8	1.63					
France / 2003	1.87			30.0	1.01					

Sources: 2000 Brazilian Demographic Census; 2007 National Annual Household Survey (PNAD); and PRB, World Fertility Patterns 2007.

Note: Index of Postponement is defined as the ratio of age-specific fertility rate of women 30 and over, to the rates for women in the 20-29 age range.

TABLE 2: DESCRIPTIVE STATISTICS FOR SEVERAL INDICATORS ON REPRODUCTIVE HISTORIES FOR WOMEN AGED 25-49, ACCORDING TO EDUCATION AND SOCIOECONOMIC GROUPS. BRAZIL, 1996.

	N	Mean	Std Dev	Min	Max	25th	50th	75th
<i>All Women 25-49</i>								
A- Age at first sexual intercourse	7324	<b>19.3</b>	4.2	8	47	16	<b>19</b>	21
C- Age at first union	7187	<b>20.6</b>	4.6	10	47	17	<b>20</b>	23
E- Age at first birth	7007	<b>21.7</b>	4.5	10	47	18	<b>21</b>	24
Interval between A and E	6684	<b>2.8</b>	2.9	0	25	1	<b>2</b>	4
Interval between C and E	6825	<b>1.3</b>	2.8	-30	23	1	<b>1</b>	2
<i>0-8 years of schooling</i>								
A- Age at first sexual intercourse	5293	<b>18.7</b>	4.0	8	47	16	<b>18</b>	21
C- Age at first union	5336	<b>20.0</b>	4.4	10	47	17	<b>19</b>	22
E- Age at first birth	5269	<b>21.0</b>	4.2	10	47	18	<b>20</b>	23
Interval between A and E	5011	<b>2.6</b>	2.7	0	24	1	<b>2</b>	3
Interval between C and E	5146	<b>1.2</b>	2.8	-30	23	0	<b>1</b>	2
<i>9 or more years of schooling</i>								
A- Age at first sexual intercourse	2029	<b>20.9</b>	4.3	9	45	18	<b>20</b>	23
C- Age at first union	1849	<b>22.4</b>	4.6	11	45	19	<b>22</b>	25
E- Age at first birth	1736	<b>23.9</b>	4.6	12	42	21	<b>23</b>	27
Interval between A and E	1671	<b>3.4</b>	3.3	0	25	1	<b>2</b>	4
Interval between C and E	1677	<b>1.7</b>	2.5	-16	23	1	<b>1</b>	2
<i>Lower class</i>								
A- Age at first sexual intercourse	4008	<b>18.7</b>	4.0	9	43	16	<b>18</b>	21
C- Age at first union	3990	<b>20.0</b>	4.4	10	45	17	<b>19</b>	22
E- Age at first birth	3956	<b>20.9</b>	4.1	10	47	18	<b>20</b>	23
Interval between A and E	3737	<b>2.7</b>	2.7	0	24	1	<b>2</b>	3
Interval between C and E	3832	<b>1.1</b>	2.9	-30	20	0	<b>1</b>	2
<i>Middle class</i>								
A- Age at first sexual intercourse	2223	<b>19.7</b>	4.4	8	47	17	<b>19</b>	22
C- Age at first union	2160	<b>20.8</b>	4.6	10	47	18	<b>20</b>	23
E- Age at first birth	2077	<b>22.0</b>	4.7	12	42	19	<b>21</b>	24
Interval between A and E	2002	<b>2.7</b>	2.8	0	23	1	<b>2</b>	3
Interval between C and E	2034	<b>1.4</b>	2.7	-16	23	1	<b>1</b>	2
<i>Upper class</i>								
A- Age at first sexual intercourse	964	<b>20.6</b>	4.3	12	45	18	<b>20</b>	23
C- Age at first union	915	<b>22.0</b>	4.8	13	45	19	<b>21</b>	24
E- Age at first birth	854	<b>23.7</b>	5.0	14	42	20	<b>23</b>	26
Interval between A and E	830	<b>3.4</b>	3.5	0	25	1	<b>2</b>	5
Interval between C and E	844	<b>2.0</b>	2.5	-8	23	1	<b>1</b>	3

Source: 1996 Brazilian Demographic Health Survey



TABLE 3A. DESCRIPTIVE STATISTICS FOR SEVERAL INDICATORS ON REPRODUCTIVE HISTORIES FOR WOMEN AGED 25-49, ACCORDING TO EDUCATIONAL GROUPS. BRAZIL, 2006.

	<i>N</i>	<i>Mean</i>	<i>Std Dev</i>	<i>Min</i>	<i>Max</i>	<i>25th</i>	<i>50th</i>	<i>75th</i>
<i>All Women 25-49</i>								
A- Age at first sexual intercourse	10150	<b>18.5</b>	3.8	7	46	16	<b>18</b>	20
B- Age at first contraceptive use	9629	<b>20.0</b>	4.4	10	48	17	<b>19</b>	22
C- Age at first union	9515	<b>20.8</b>	4.9	11	47	17	<b>20</b>	23
D- Age at first pregnancy	9250	<b>21.1</b>	4.8	10	43	18	<b>20</b>	24
E- Age at first birth	9132	<b>21.9</b>	4.8	10	43	18	<b>21</b>	25
Interval between A and B	9549	<b>1.5</b>	3.3	0	35	0	<b>0</b>	2
Interval between C and E	8844	<b>1.5</b>	3.4	-29	24	0	<b>1</b>	3
Interval between A and E	9006	<b>3.7</b>	3.4	0	24	1	<b>3</b>	5
<i>0-8 years of schooling</i>								
A- Age at first sexual intercourse	5966	<b>17.7</b>	3.5	7	46	15	<b>17</b>	19
B- Age at first contraceptive use	5555	<b>19.9</b>	4.5	10	48	17	<b>19</b>	22
C- Age at first union	5860	<b>19.5</b>	4.4	11	46	16	<b>19</b>	22
D- Age at first pregnancy	5791	<b>19.8</b>	4.1	10	39	17	<b>19</b>	22
E- Age at first birth	5755	<b>20.7</b>	4.2	11	41	18	<b>20</b>	23
Interval between A and B	5492	<b>2.2</b>	3.7	0	35	0	<b>1</b>	3
Interval between C and E	5618	<b>1.3</b>	3.5	-29	24	0	<b>1</b>	2
Interval between A and E	5651	<b>3.1</b>	3.0	0	24	1	<b>2</b>	4
<i>9 or more years of schooling</i>								
A- Age at first sexual intercourse	4103	<b>19.5</b>	3.9	10	40	17	<b>18</b>	22
B- Age at first contraceptive use	3997	<b>20.2</b>	4.3	12	44	17	<b>19</b>	22
C- Age at first union	3575	<b>22.5</b>	5.2	12	47	19	<b>22</b>	25
D- Age at first pregnancy	3382	<b>23.0</b>	5.2	10	43	19	<b>22</b>	26
E- Age at first birth	3304	<b>23.8</b>	5.1	10	43	20	<b>23</b>	27
Interval between A and B	3980	<b>0.8</b>	2.4	0	28	0	<b>0</b>	1
Interval between C and E	3154	<b>1.9</b>	3.4	-24	23	1	<b>2</b>	3
Interval between A and E	3283	<b>4.6</b>	3.9	0	23	2	<b>3</b>	7

Source: 2006 Brazilian Demographic Health Survey.

TABLE 3B. DESCRIPTIVE STATISTICS FOR SEVERAL INDICATORS ON REPRODUCTIVE HISTORIES FOR WOMEN AGED 25-49, ACCORDING TO SOCIOECONOMIC GROUPS. BRAZIL, 2006.

<i>Lower class</i>								
A- Age at first sexual intercourse	3246	<b>17.8</b>	3.7	8	46	15	<b>17</b>	19
B- Age at first contraceptive use	2941	<b>20.6</b>	4.7	11	47	17	<b>19</b>	23
C- Age at first union	3137	<b>19.7</b>	4.5	11	46	16	<b>18</b>	22
D- Age at first pregnancy	3117	<b>19.7</b>	4.1	10	43	17	<b>19</b>	22
E- Age at first birth	3099	<b>20.6</b>	4.1	11	40	17	<b>20</b>	23
Interval between A and B	2903	<b>2.9</b>	4.2	0	33	0	<b>1</b>	4
Interval between C and E	2981	<b>1.2</b>	3.2	-22	24	0	<b>1</b>	2
Interval between A and E	3030	<b>3.1</b>	2.9	0	24	1	<b>2</b>	4
<i>Middle class</i>								
A- Age at first sexual intercourse	4637	<b>18.4</b>	3.7	7	45	16	<b>18</b>	20
B- Age at first contraceptive use	4467	<b>19.8</b>	4.2	10	48	17	<b>19</b>	22
C- Age at first union	4363	<b>20.5</b>	4.6	11	47	17	<b>20</b>	23
D- Age at first pregnancy	4237	<b>20.8</b>	4.5	10	40	17	<b>20</b>	23
E- Age at first birth	4174	<b>21.7</b>	4.6	10	43	18	<b>21</b>	24
Interval between A and B	4430	<b>1.3</b>	2.8	0	35	0	<b>0</b>	2
Interval between C and E	4052	<b>1.4</b>	3.5	-29	24	0	<b>1</b>	3
Interval between A and E	4127	<b>3.5</b>	3.2	0	24	1	<b>2</b>	5
<i>Upper class</i>								
A- Age at first sexual intercourse	2231	<b>19.4</b>	4.0	11	40	17	<b>18</b>	21
B- Age at first contraceptive use	2188	<b>20.0</b>	4.3	12	40	17	<b>19</b>	22
C- Age at first union	1981	<b>22.5</b>	5.5	13	46	19	<b>22</b>	25
D- Age at first pregnancy	1862	<b>23.2</b>	5.4	12	41	19	<b>23</b>	26
E- Age at first birth	1827	<b>24.1</b>	5.5	13	41	20	<b>24</b>	27
Interval between A and B	2183	<b>0.6</b>	2.1	0	20	0	<b>0</b>	1
Interval between C and E	1779	<b>2.2</b>	3.6	-21	19	1	<b>2</b>	3
Interval between A and E	1818	<b>5.0</b>	4.3	0	22	2	<b>4</b>	7

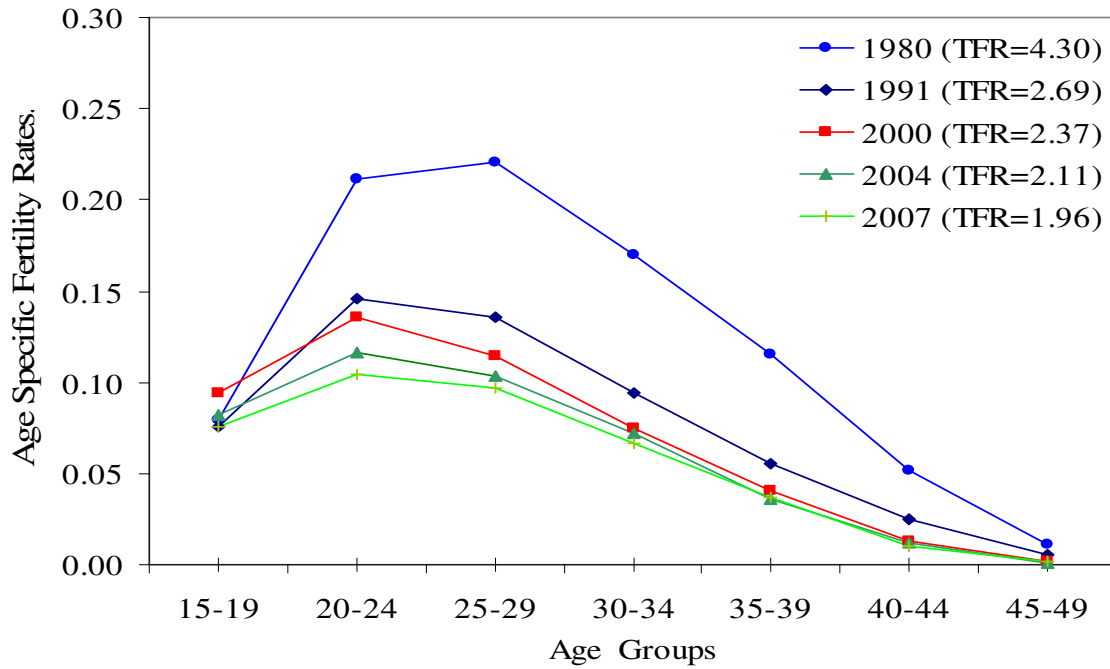
Source: 2006 Brazilian Demographic Health Survey.

TABLE 4. UNWANTED FERTILITY ESTIMATES FROM DIFFERENT METHODS. BRAZIL, 1996 AND 2006.

Year	Percent of Births			Total Fertility Rates			
	Unwanted		Overall TFR	Unwanted			Wanted
	Ideal vs. Living	Casterline & El-Zeini		Ideal	Bongaarts	Casterline & El-Zeini	Casterline & El-Zeini
1986	29.2	43.1	3.42	1.15	1.37	1.60	1.82
1996	28.7	44.4	2.54	0.75	1.04	1.16	1.37
2006	21.6	34.1	1.79	0.39	0.43	0.63	1.16

Source: Casterline and Mendonza (2009).

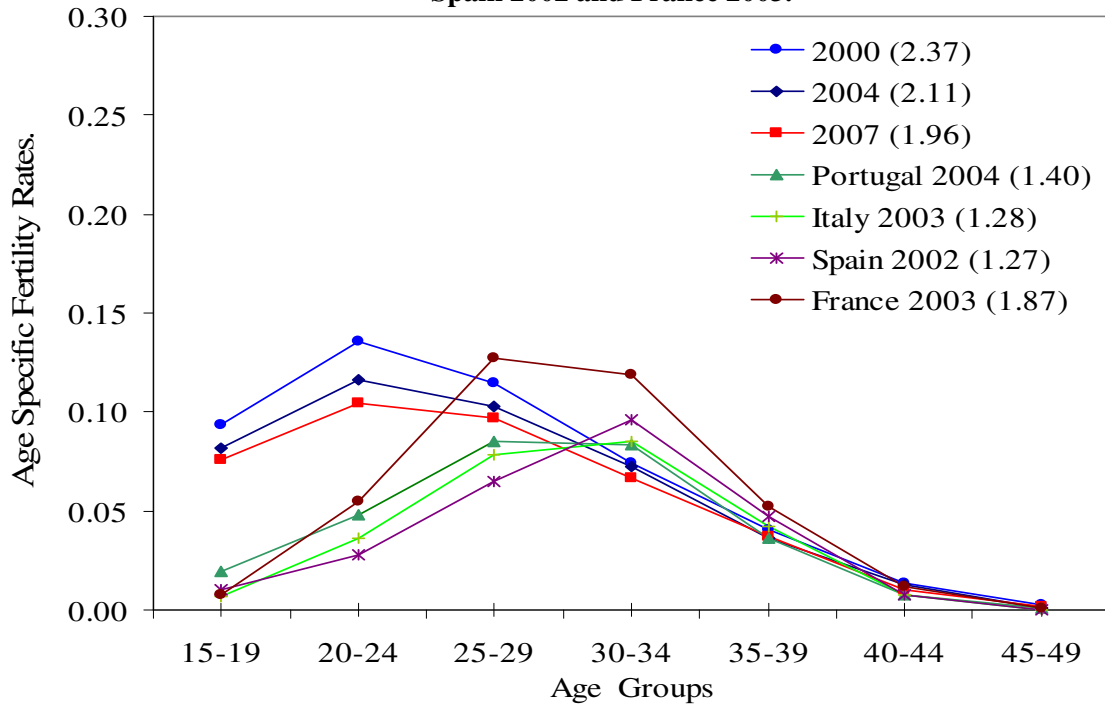
**Figure I. Age-specific fertility rates. Brazil, 1980/2007.**



Sources: Brazilian Demographic Censuses of 1980, 1991 and 2000. 2004 and 2007 National Annual Household Surveys (PNAD).

Note: 1) Data comparison for the two different data sources has to be performed with care, since the Household Survey samples only confirm trends within the decade and not the level of fertility in each survey compared to the census data. 2) TFR is shown between parentheses.

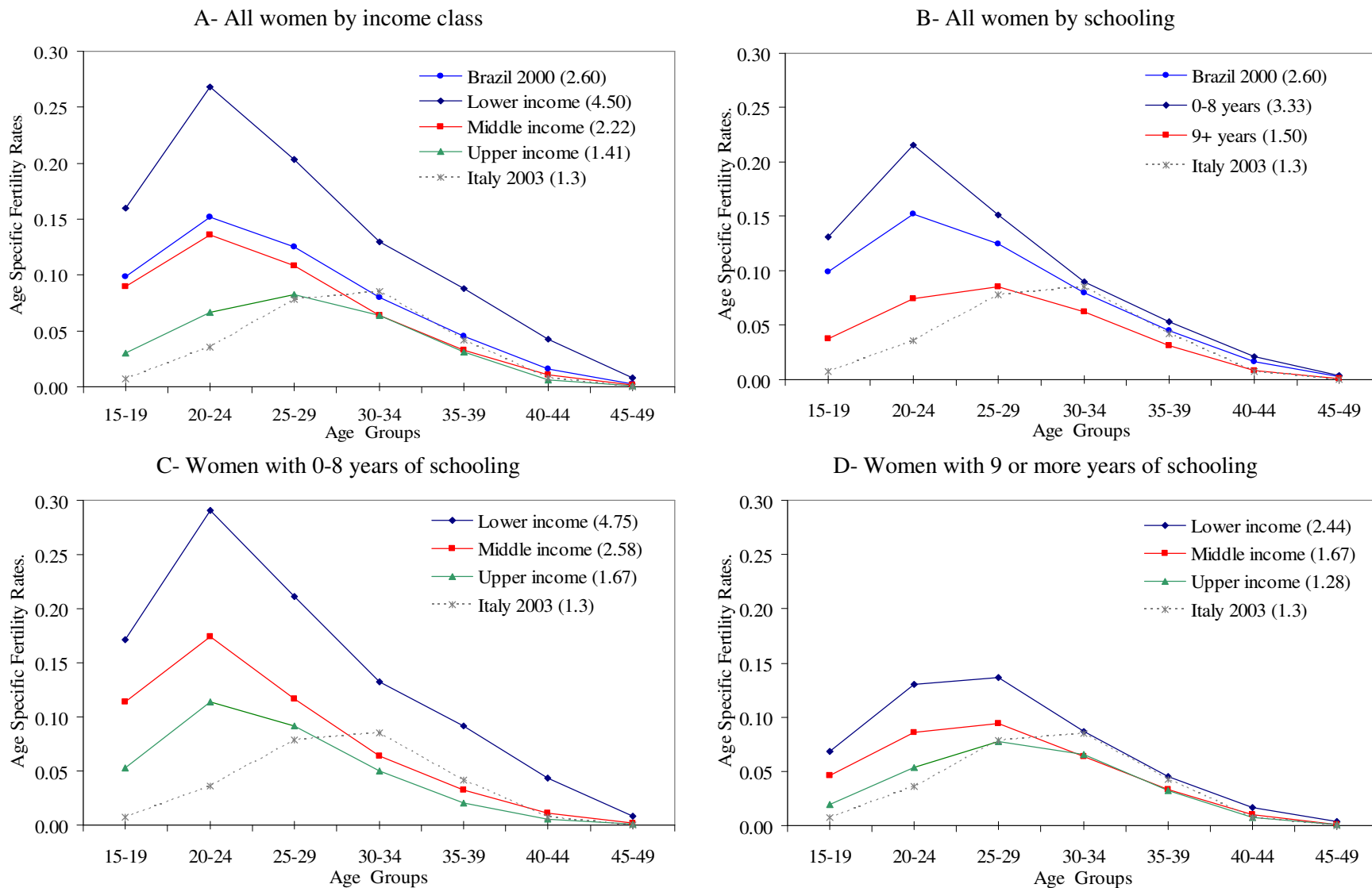
**Figure II. Age-specific fertility rates for Brazil, 2000, 2004 and 2007, Portugal 2004, Italy 2003, Spain 2002 and France 2003.**



Sources: Brazilian Demographic Census of 2000. 2004 and 2007 National Annual Household Surveys (PNAD). PRB, World Fertility Patterns 2007.

Note: TFR is shown between parentheses.

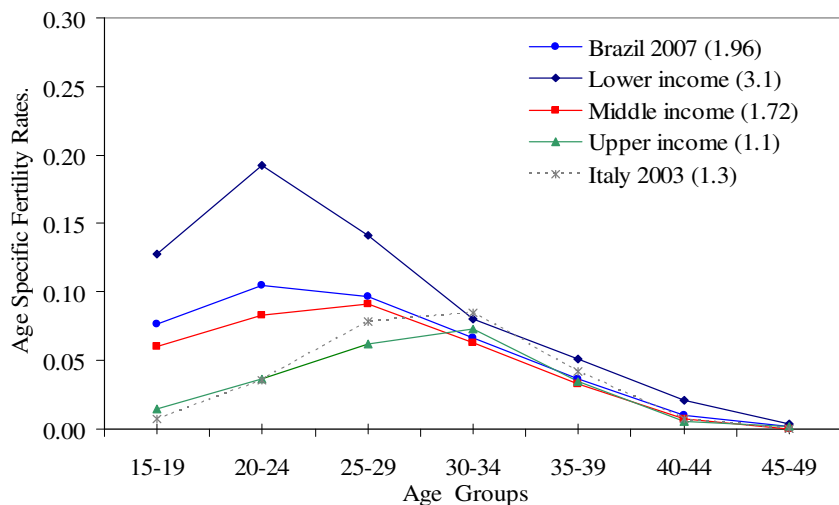
**Figure III. Age-specific fertility rates by years of schooling and income classes. Brazil, 2000.**



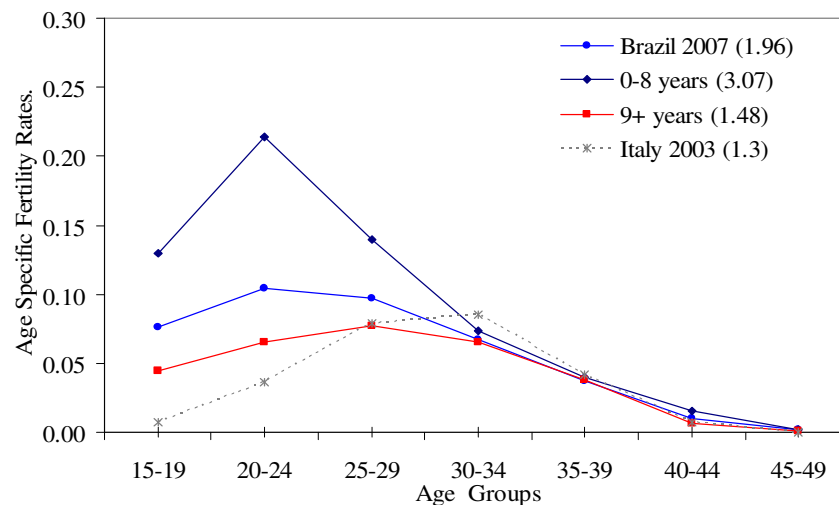
Source: 2000 Brazilian Demographic Census. Note: TFR is shown between parentheses.

**Figure IV. Age-specific fertility rates by years of schooling and income classes. Brazil, 2007.**

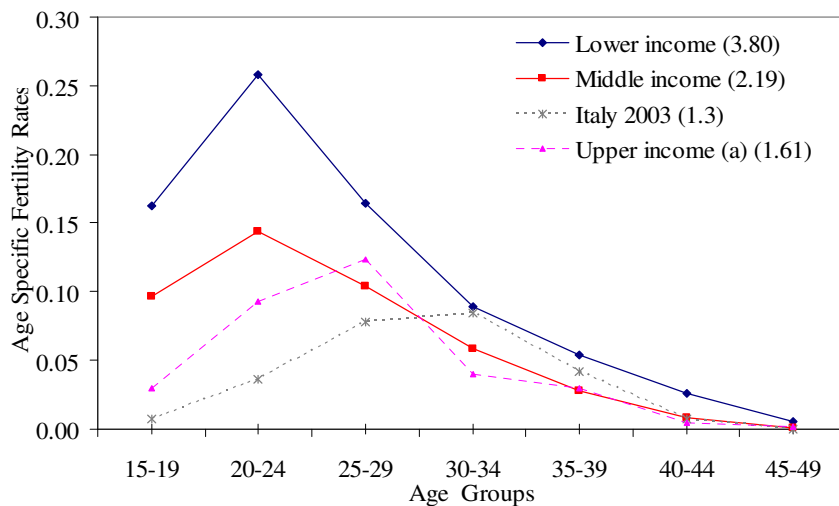
**A- All women by income class**



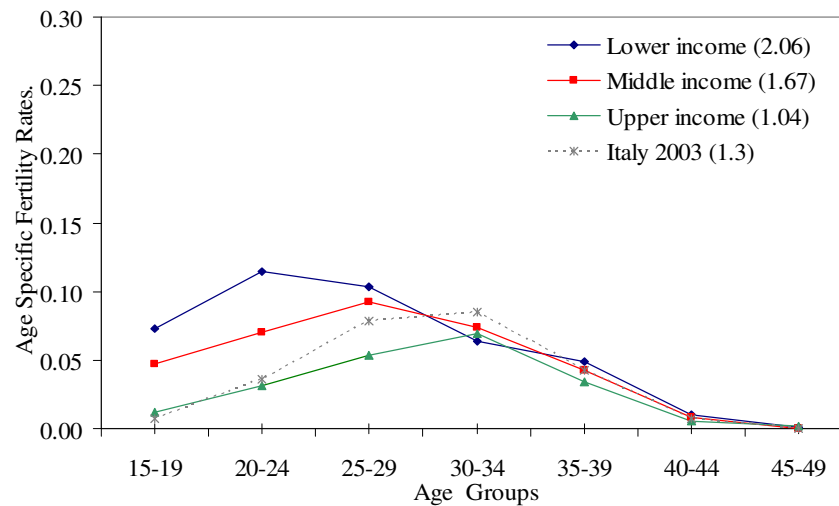
**B- All women by schooling**



**C- Women with 0-8 years of schooling**



**D- Women with 9 or more years of schooling**

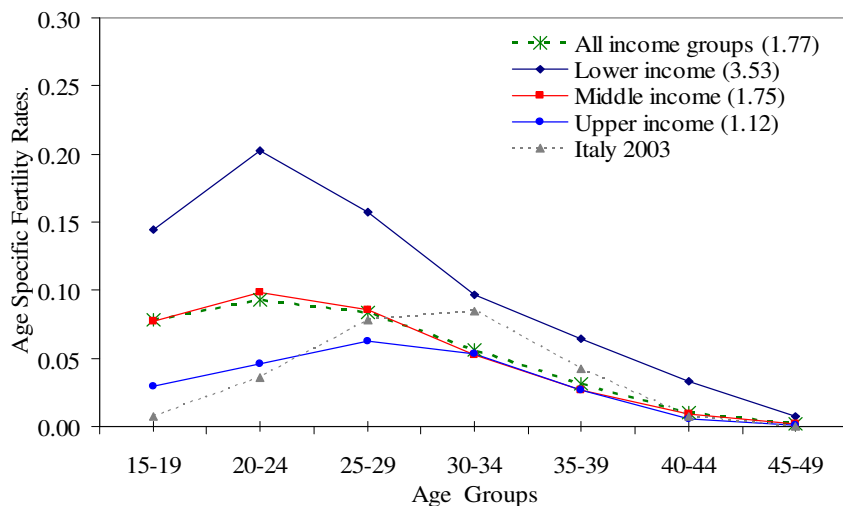


(a) Data unreliable due to sample size variation.

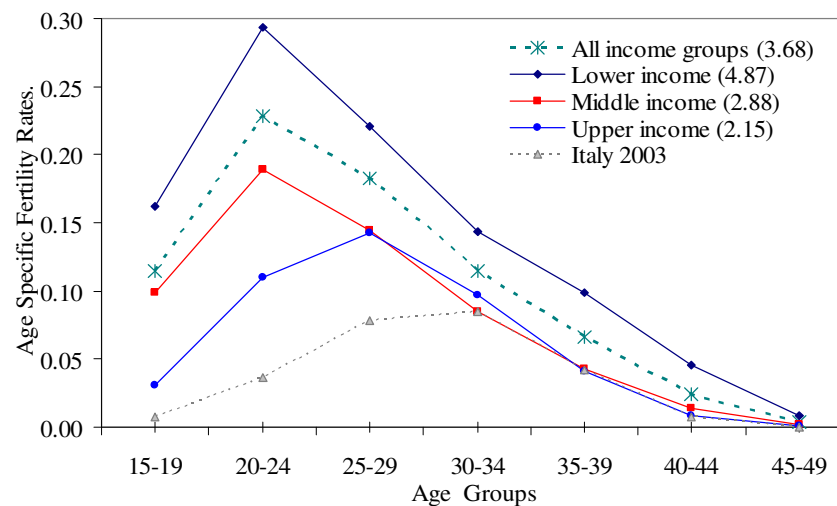
Source: 2007 National Annual Household Survey (PNAD). Note: TFR is shown between parentheses

**Figure V. Age specific fertility rates by women's labour force participation by income groups. Brazil, 2000 and 2007.**

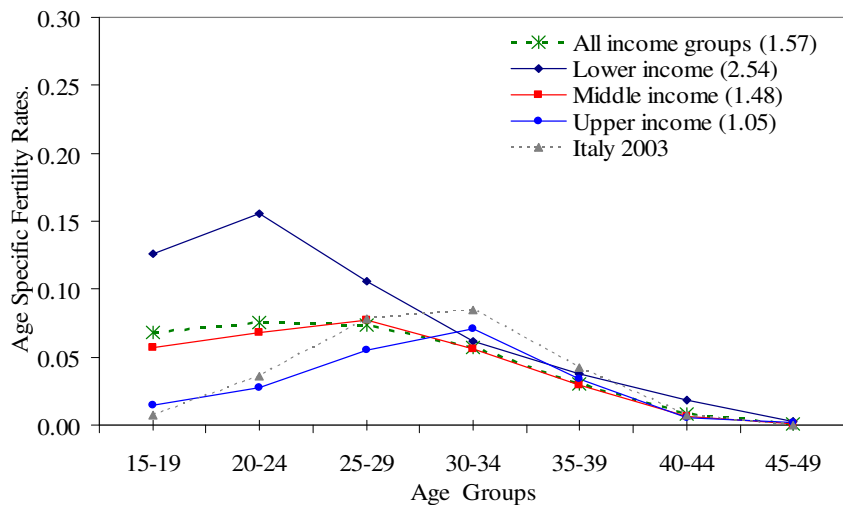
A- Women in the labour force, 2000.



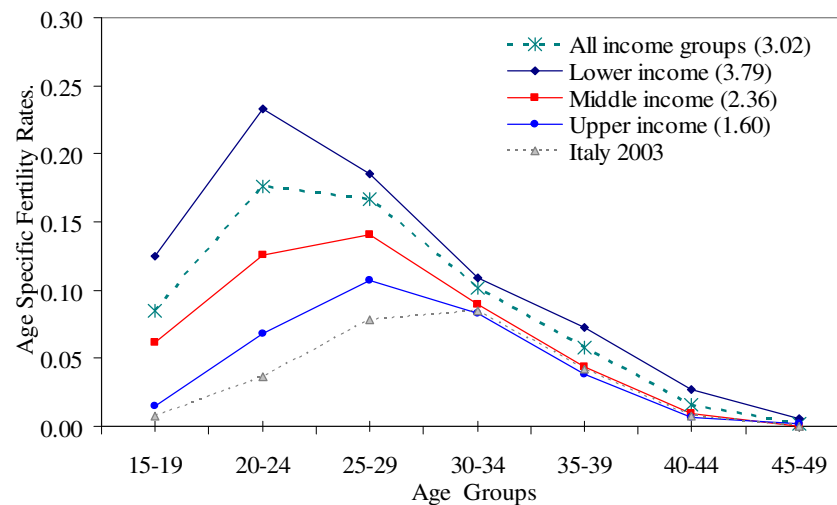
B- Women out of labour force, 2000.



C- Women in the labour force, 2007

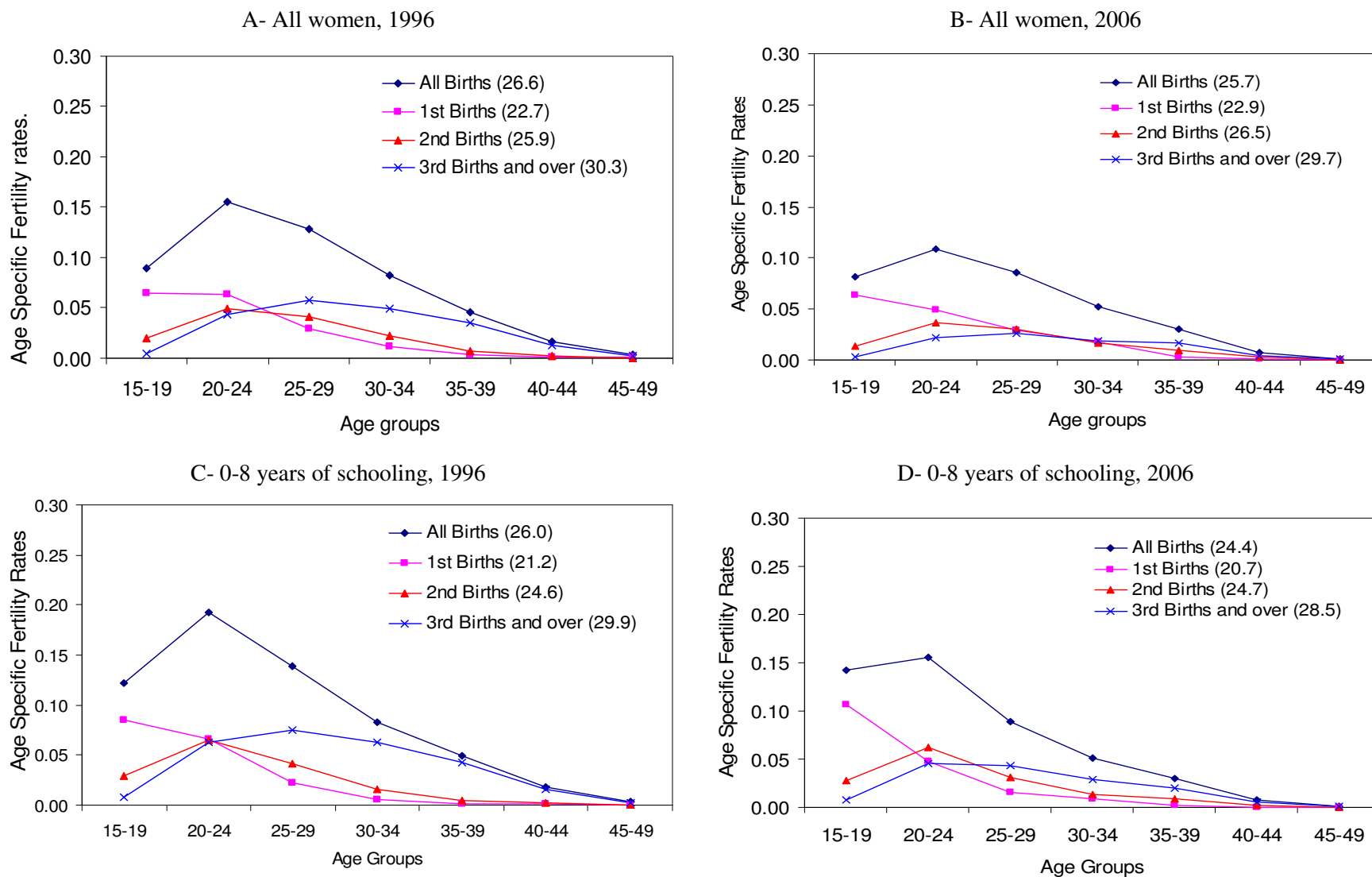


D- Women out of labour force, 2007



Sources: 2000 Brazilian Demographic Census and 2007 National Annual Household Survey (PNAD). Note: TFR is shown between parentheses.

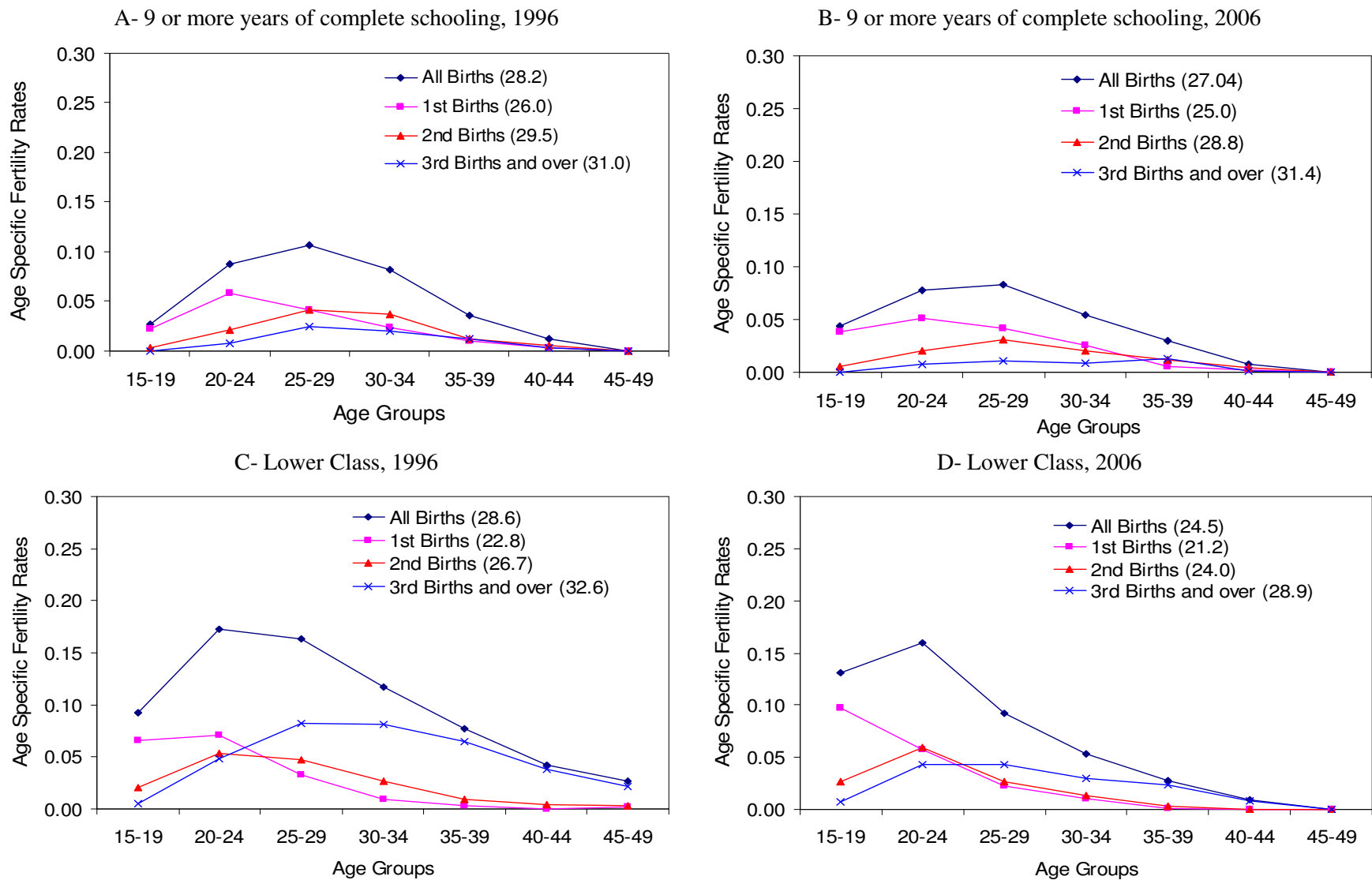
**Figure VI. Age specific fertility rates and mean age at childbearing (in the label between parentheses) by birth order according to women's characteristics, Brazil, 1996 and 2006.**



Source: 1996 and 2006 Brazilian Demographic Health Surveys.



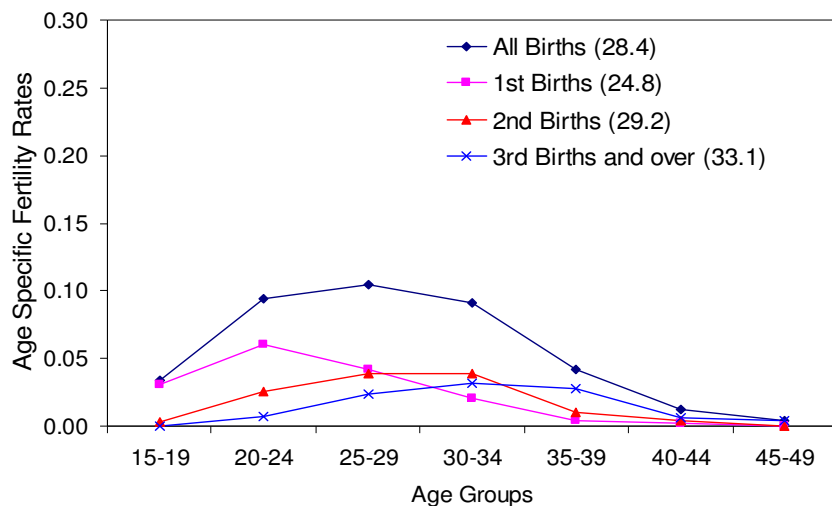
**Figure VII. Age specific fertility rates by birth order and women's characteristics. Brazil, 1996 and 2006.**



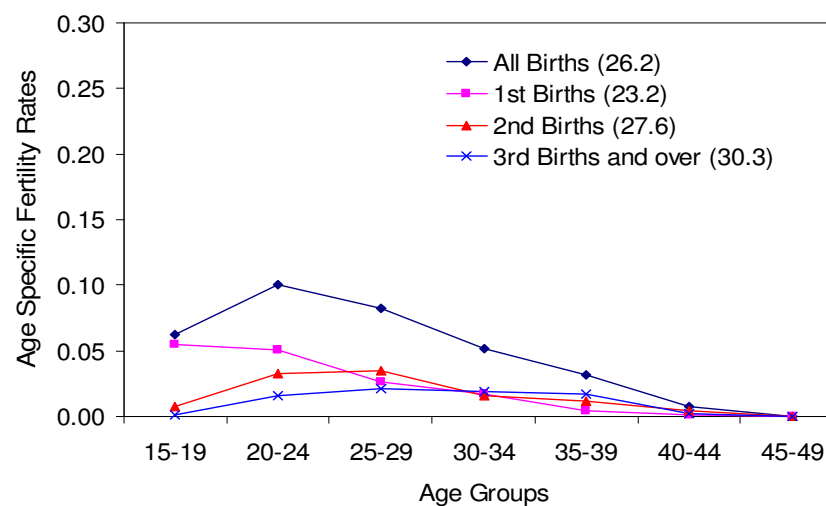
Source: 1996 and 2006 Brazilian Demographic Health Surveys

**Figure VIII. Age specific fertility rates by birth order and women's characteristics. Brazil, 1996 and 2006.**

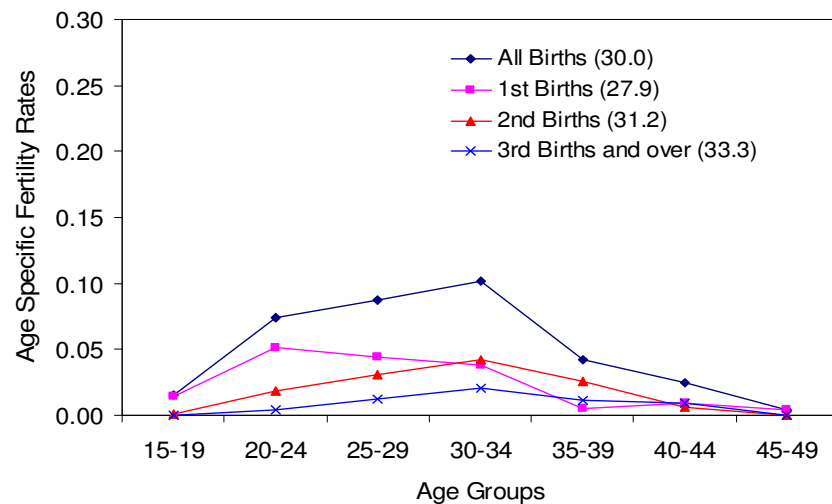
A- Middle Class, 1996



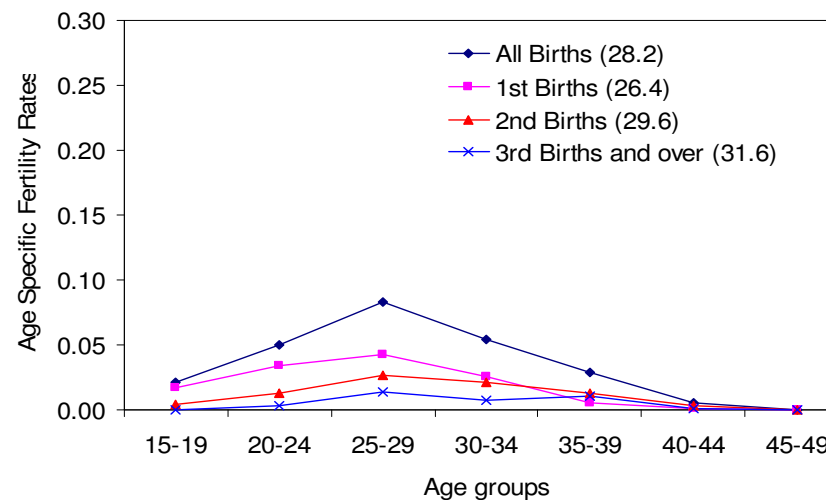
B- Middle Class, 2006



C- Upper Class, 1996



D- Upper Class, 2006



Source: 1996 and 2006 Brazilian Demographic Health Surveys.

## NOTES

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<sup>1</sup> Currently, Brazil accounts for one third of the Latin American population.

<sup>2</sup> The system is not based on the age of the students in defining the degree of school progression. Thus, to have one year of complete schooling does not necessarily mean that the person stayed at school for only one year.

<sup>3</sup> From 2005, the education system began a change to basic schooling of 9 years, not by adding one year on to the end of basic school, but by considering one year of pre-school as the first year of schooling. Because this change is recent and our population of interest is 15 years and older, in 2000 or in 2007 we assumed that this group has at best completed basic education.

<sup>4</sup> Although it is not recommended to include census and *PNAD* data in the same graph, because of comparability problems, we do so here due to space constraints only to illustrate fertility trends by age groups and not to compare level of ASFR among the different data sources.

<sup>5</sup> In another study we have seen that the tendency of increasing adolescent fertility was already present in the 1970's (Barbosa, 2007), thus not a new event in the 1990's.

<sup>6</sup> Again, it is not an overstatement to point out that this period of analysis involves a huge change in the composition of education, mostly affecting women aged between 15 and 29, so all changes as a result of education are confused by different cohort experiences, and have to be analyzed with extra care.

<sup>7</sup> In 2000, the rate of labour force participation for women aged 15-49 was 47.8% and by 2007 it had climbed to 66.5%.

<sup>8</sup> For purposes of comparison, we kept the scales for the graphs comparable to those presented earlier in the text.

<sup>9</sup> According to DHS data and the using the ideal versus observed number of children, the observed TFR in 1996 was 2.5 and the wanted TFR was 1.8 children per woman and, for 2006, the corresponding figures were 1.8 and 1.6. It is interesting to see that the 2006 the observed rate was equal to the wanted rate in 1996.