United Nations
Department of Economic and Social Affairs

Population Division

Expert Paper
No. 2011/8

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United Nations New York, 2011

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This publication has been issued without formal editing.

PREFACE

In December 2009, the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat convened an Expert Group Meeting on Recent and Future Trends in Fertility at United Nations Headquarters in New York. The purpose of the meeting was to discuss recent changes in fertility trends in the major regions of the world and in selected countries as well as their determinants. Such a discussion set the stage for the consideration of a new approach to the projection of fertility in the preparation of the official United Nations population projections.

The meeting took place from 2 to 4 December 2009. Its agenda and list of participants can be found on the website of the Population Division (www.unpopulation.org). The papers prepared by experts participating in the meeting will be issued as part of the newly launched Expert Paper series available as downloadable PDF files and accessible on the Population Division website (www.unpopulation.org).

This paper focuses on the timing of childbearing in Brazil among different socioeconomic groups and addresses reasons why the fertility schedule of Brazil—having fewer children and having them early—is so different from that of other countries with below replacement fertility. Possible patterns of fertility in the future and their implications for population growth are also considered.

The Expert Paper series aims at providing access to government officials, the research community, non-governmental organizations, international organizations and the general public to overviews by experts on key demographic issues. The papers included in the series will mainly be those presented at Expert Group Meetings organized by the Population Division on the different areas of its competence, including fertility, mortality, migration, urbanization and population distribution, population estimates and projections, population and development, and population policy.

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A. INTRODUCTION

Several Latin American countries have reached below-replacement fertility, if not in terms of the country average, at least for large socio-economic or regional groups within the country. Brazil, the largest of these countries,[1] already has below-replacement fertility, as shown 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 (PNDS 2006) showed fertility at 1.8 children per woman. Hence, one might easily conclude that Brazil is following the path of Mediterranean countries like Italy, Spain and Portugal. Indeed, the pace of continuous decline observed suggests that 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 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 older age groups, in Brazil there has been an increasing rejuvenation of the fertility schedule ("fertility rejuvenation") as fertility rates fall. The decline in fertility in Brazil has occurred mainly by stopping and not by spacing births throughout the reproductive years. Moreover, the mode of current fertility is among women aged 20 to 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 socio-economic 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 countries' 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 for increasing development and reducing economic and social inequality.

B. BACKGROUND

In the not too distant past, studies in Brazil were proposing hypotheses to explain why fertility was high (Paiva, 1985). Until the 1980s, the predominant stance among Brazilian demographers was that there was not, in general, a demand for contraception, and 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, total fertility has fallen to unforeseen levels. Berquó and Cavenaghi (2005) show that only 4.7 per cent of women had fertility regimes with an average number of children of five or more, 37.5 per cent had between 2.1 and 4.9 children, and 57.7 per cent had reached below-replacement fertility regimes by 2003. The number of childless women and men and the number of one-child parents are on the increase in Brazil. In 1996, 8.8 per cent of women were at the end of their reproductive life (45 to 49) without having had children and by 2006 this estimate climbed to 13.4 per cent. Also, there were 7.7 per cent of women aged 45 to 49 with only one child and the estimate 10 years later was 14.3 per cent. 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 per cent of births were planned for the moment of pregnancy, 28 per cent had been planned for later (mistimed) and 18 per cent 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 per cent on average), including fertility questions. Hence, for an initial analysis, the 2000 Demographic Census data are used. Additionally, to provide more recent information, the 2007 National Annual Household Survey (PNAD) is used for more aggregated analyses, and the Demographic and Health Survey (PNDS) is 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 in this paper 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, specifically the Brass P/F ratio technique (United Nations, 1983).

Regarding the socio-economic variables used in this paper, the literature points to larger socio-economic differentials in fertility in Latin America. Brazil is no exception to this pattern, 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, socio-economic groups are analyzed based on income distribution and women's education. Both variables have compositional effects on total fertility estimates, but as both income and education have shown an improvement in recent years in Brazil, the estimates may be biased on the low side. In other words, total fertility would be even lower for the upper income and educational groups if no improvement were seen in these two areas. For income, a relative categorization is used based on the quartile distribution of per capita household income, divided into three groups: 1) the first quartile representing the lowest 25 per cent of the income class, 2) the second and third representing the middle income class, and 3) the last quartile defining the upper income class. The classification was performed at the household level and all women aged 15 to 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[2] and the system is divided into basic schooling, 1 to 8 years of complete education[3], high school from 9 to 11 years and 12 or more years 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 adolescent fertility is very high in Brazil, only two categories of education are used: 0 to 8 years and 9 or more years of education.

The 2006 Brazilian Demographic Health Survey (PNDS 2006), as with other Demographic Health Surveys worldwide which collect birth history information, the PNDS shows a lower total fertility level 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 actual total fertility), but to use both sets of data to evaluate the type of data provided by each. Using a little caution, the PNAD permits disaggregating data in different socio-economic groups and the PNDS provides more information on the story behind reproductive histories. In addition, socio-economic groups in the PNDS are not directly calculated from the household members' earnings, but rather from a methodology that creates an estimate of socio-economic level based on the possession of appliances and cars, whether maids live in the household, and the education of the head of the household (Cavenaghi, 2009). The index to estimate socio-economic status is categorized into lower, middle and upper socio-economic groups similar to the bottom, second and third quartiles of the distribution.

D. Fertility Trends and Patterns

The Census and the data from the PNAD[4] confirm the decrease in total fertility between 1940 and 2008 (figure I, panel A). The decline in the level of fertility seen during the 1980s was remarkable as was the even higher concentration of births at younger ages observed during this overall decrease in fertility levels, changing the fertility age pattern as well (figure I, panel B). The 1990s did not follow the same trend in 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. However, 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 age 30 or over, a very small decline—almost stalling for those aged 20 to 24—and an increase for those below 20 years old.[5] Data for the current decade from the National Household Survey, again shows a large decline, as was seen in the 1980s, for women aged 20 to 24, and a smaller decline for all other age groups, including adolescents. In broad terms, fertility levels have always decreased for all women aged 20 or over, but were somewhat unstable for women aged 15 to 19, showing an increase at first, from around 80 to 94 children per one thousand women aged 15 to 19 during the period 1980-2000, and in the current decade showing a small decrease to 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.

By comparing Brazilian rates with those in some European countries, two different, overall patterns are observed (figure II), an earlier fertility pattern and a later one. The timing and level of fertility for those countries with Latin origins are similar to those in Brazil only for women age 30 or over, but the rates for Brazil are lower than in all other countries in the figure. Yet 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 to 19 is close to zero in these developed countries, while in Brazil it is around 80 children for every thousand women aged 15 to 19. Every thousand women aged 20 to 24 have fewer than 50 children in the countries of Latin origin while in Brazil they have the highest fertility rates among all ages: above 100 children per thousand women. Hence, the differences in total fertility among these countries are mainly due to the timing of childbearing for younger women.

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 is 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, one can get an idea about what could happen to Brazilian total fertility in the next few years. One possible course that Brazilian women could soon follow would be to decrease adolescent and young adult fertility (ages 15 to 24) by termination (i.e., not just postponing and having children later). If this is the case, Brazil will have very low fertility levels like Italy, Portugal and Spain. Indeed, studies have shown that there is already a tendency towards decreasing fertility in the 15 to 19 age group (Cavenaghi and Berquó, 2005), and the period rates for women age 25 or over 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, as in France, which would maintain current levels of fertility (changing period total fertility but not cohort total fertility. 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 two children per woman, as in the case of the United States of America (Preston and Hartnett, 2008). To address these questions and put forward some hypotheses on the future of Brazilian fertility, analyzing the behaviour of different socio-economic groups over recent years in Brazil is useful.

1. *Socio-economic 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 (panel A) and figure IV for 2007 (panel A), there are different patterns in the timing of fertility according to income (the female population is divided into three income groups, which for ease are labelled 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 figures) 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 total fertility continues to decrease for all groups, even for those groups that already show low fertility levels.

Although fertility was not below replacement level at the national level in 2000, women in the upper income group (figure III, panel A) or women with nine years or more of completed schooling (figure III, panel B) presented low TFR (less than 1.5) and had fertility age patterns closer to those of 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 to 29. Having lower education or being in the lower income group changes 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 ages 20 to 24 if women were in the lower quartile of income or if they had less than nine years of education (completed primary school or less).

Seven years later, total fertility had decreased for all income and educational groups, but with greater magnitude in the case of income groups, and ASFR had changed substantially only for the middle and upper income groups, the latter reaching a very low fertility level of 1.1 children per woman (figure IV, panel A). Data from the National Household Survey cannot be used to estimate fertility, within a reasonable margin of error, for highly educated women (such as those who completed high school or higher), but there are indications that the pattern of fertility also changed for the very highly educated. However, this pattern is not repeated for women with nine 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. At the same time, the division into social classes indicates important changes for women in the middle and upper income groups.[6]

When the population is cross-classified by income group and years of schooling, the fertility distribution in 2000 presents an older shape for the more educated women, regardless of income group (the mode of the fertility distribution is the age group 25 to 29 for all income groups if women have nine or more years of schooling (figure III, panel D). Yet as can be observed in panel C for the least educated (0 to 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 groups have a very young pattern, with the highest concentration in the age group 15 to 24. In spite of this, when making a comparison with developed countries (see Italy as an example in the figures), even women who had attained a higher level of education did not reach those developed country fertility patterns. However, the combination of schooling with income appears to enable a change in women's behaviour with regard to childbearing, where the higher educated and higher income group (nine or more years of education and in the 25 per cent upper income class) in the situation of very low fertility levels.

The experience of motherhood is very much associated with other life course transitions and opportunities. A younger woman who stays at school for a longer time and has better opportunities in the job market might not seek traditional life course transitions such as marriage and childbearing. Much of the decline in total fertility 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, panels C and D). For the least educated, there is a continuous decrease in fertility among all income classes, but the shape of the distribution of age-specific fertility rates does not change (with the exception of the higher income class, but this includes 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 groups do change the pattern of childbearing: the poorest group presents an even higher fertility rejuvenation compared to 2000, and the middle and upper income groups start to show a move towards fertility postponement. One might infer 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 a very low level, 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 53 million women of reproductive age; over 17 million women were living in the 25 per cent poorest households, while in the upper income group there were about 11 million women. The two population segments that presented postponement in childbearing, as previously noted, namely the better educated from the upper and middle income groups, accounted for more than 22 million women and had very low fertility levels in 2007. During these seven years, there was an enormous growth in the size of the better educated population, an increase of almost 80 per cent in women with nine or more years of completed schooling. Indeed growth occurs for all social strata, but with greater magnitude among the middle and lower income groups.

The index of postponement, defined by Lesthaeghe and Neidert (2006) as the ratio of the age-specific fertility rate of women age 30 or over to the rate for women in the 20 to 29 age group, reaffirms the young age pattern of fertility as analyzed previously. The index also shows that the concentration of fertility in the 20 to 29 age group is much higher for the least educated and least wealthy population; about two thirds of births occur among women in the 20 to 29 age group. Important changes are also observed between 2000 and 2007 in the timing of childbearing. According to 2000 data, the postponement index was closer to that of the developed countries only for the upper income group, above 0.8, and by 2007 this same population group displays a very high index. Moreover, the better educated in the wealthiest 25 per cent 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, other factors must be examined 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.

Figure V shows the ASFR curves for women both in and out of the labour force for 2000 and 2007 data. In panels A and B 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 to 26 years old, data not shown). The fertility pattern changes if those groups are divided according to income group. Again, only the upper income women and those participating in the labour force present a later pattern of fertility experience. The 2007 data (panels C and D) show that the total fertility levels

decreased for all groups and there was little postponement in fertility except for the lower income group for women in or out of the labour force. In other words, the postponement of fertility is again associated with women's economic situation and not women's participation in the labour market, which has greatly increased since 2000.[7] Women in the labour force who belong to the upper income group, who numbered more than eight million in 2007, present a fertility pattern closer to that of Italy but with an even lower total fertility level 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 shown earlier. Contrary to observations in other countries, the tempo effect in period-fertility rates has had a negative effect (Rios-Neto et al., 2005) on total fertility estimates in Brazil. One additional feature, distinct from many other countries, is that marriage in Brazil cannot be understood as legal marriage, since consensual unions are very common and consensual union rates have increased in recent decades (Berquó, 2001). In addition, sexual intercourse frequently precedes union formation and even more so in recent decades, particularly among poorer population groups in Brazil. In this section, data from reproductive histories are presented in order to understand the rejuvenated fertility pattern in a regime of low fertility.

Birth history data in Brazil are 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, data from the 1996 and 2006 surveys are compared (figures VI, VII and VIII). The indicators selected for analysis are age- and birth order-specific fertility rates estimated for the five-year period prior to the surveys, according to women's characteristics (education and income group). Additionally, descriptive statistics on age at first intercourse, age at first marriage (union, legal or otherwise) and age at first birth for women aged 25 to 49 at the time of interview are presented for both surveys. Two other important markers of reproductive histories are also presented: age at first pregnancy and age at first contraceptive use, both of which are only available in the 2006 survey.

Figures VI, VII and VIII include several panels with age and birth order-specific fertility rates for first birth, second birth and third birth or over, for the national average in 1996 and 2006, and according to groups of completed years of schooling and income groups, as well as the figures for mean childbearing age for each specific order between parentheses in the series' labels.[8] In 1996, the vast majority of first births occurred to women in the 15 to 24 age group (almost 80 per cent), and few had their first child after the age of 30. In 2006, the rate of first birth for the 20 to 24 age group decreased considerably. Women in the first age group presented non-zero fertility for second births (20 births per 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 reveal a lot about the timing of fertility, disaggregating this population into groups by completed years of schooling may show where that change is most distinct (figure VI, panels C and D and figure VII, panels A and B). Women who did not reach high school (0 to years completed education) have an even earlier pattern of fertility. Many of them started childbearing between 15 and 19 years of age (85 women per one thousand)—a much higher level than those who had at least started high school (23 women per one thousand)—and childbearing was also commonly initiated between the ages of 20 and 24. In fact, between 1996 and 2006, the rate of first births for the youngest women (aged 15 to 19) has risen to 106 births per thousand women and the subsequent age group (20 to 24) has almost the same rate as for first births. Fertility rates for birth orders three or over, even for the least educated, had decreased during the same 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 is to have fewer children and have them earlier. Increasing first order birth rates at the adolescent and young adult ages were not exclusive to less educated women; however, women who had at least entered high school showed an increase at a

much lower level. 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 to 19.

The classification of women's fertility according to socio-economic group produces very similar results as by level of completed education. Lower and middle socio-economic groups 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 socio-economic group, 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 upper socio-economic group is reached at ages 25 to 29 and the two previous age groups have far fewer births. Nevertheless, even for this upper socio-economic group, the rates are not as close to zero as one might expect given the behaviour seen among women in developed countries.

Another interesting trend is in the mean childbearing age for different birth orders (shown in parentheses in the figures discussed). Rejuvenation from 1996 to 2006, shown by the decreasing childbearing age, is due to third birth or over for the country as a whole, and mostly due to a stopping behaviour at later ages. By socio-economic groups, though, the rejuvenation shown by this indicator is mainly due to the increasing rate of fertility at adolescent (15 to 19) and young adult ages (20 to 24).

a. *Trends in other reproductive history indicators*

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 per cent use among all women and 77 per cent use of modern methods). 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 six per cent of women aged 15 to 49 had never had sexual intercourse). Several figures attract attention in table 2, for 1996 data, particularly the minimal ages of first intercourse, first union and first birth. Girls, even prior to adolescence, are already having sex and some are becoming mothers, and this is also evident from the 2006 data (tables 3A and B), indicating that this behaviour is still a norm. The maximum age of first intercourse shows 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 and median ages at first sexual intercourse in 1996 were about 19 years old and have decreased in the last ten years by about one year. Median and mean ages at first union are also very low, around 20, and have not changed substantially in recent years. The timing of first birth, on average, closely follows the timing 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 interval of time between first union and first birth is a little over one year on average. In other words, the typical pattern is to enter a union and have the first child immediately afterwards. One interesting way of picturing this scenario is that among all women who enter unions, 75 per cent 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 Brazil 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 completed education or socio-economic group. Women living in the poorest conditions start sexual intercourse, enter unions and have their first child at even earlier ages than women living in wealthier conditions. Even though there are substantial differences among these social strata, the difference between the wealthiest and the poorest are not as large as one might expect, at least for women in the upper and middle socio-economic classes. The explanation for this lies in different but related dimensions. For the first sexual intercourse, there is no different social norm by socio-economic or educational groups related to sexual activity in the country. The age at first marriage and first birth are almost the same because the norm is to marry and have a child soon after or get pregnant and marry, and if the event does not happen at ages 15 to 19 it will mostly happen between 20 to 24 years, which still is a young age.

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, on average, women start using contraception one and a half years after the first sexual intercourse (tables 3A and 3B), and the contraception referred to here is of any type, even the most traditional methods. This fact might explain the high percentage 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 per cent, as reported by women in this survey, the reasons for not immediately using contraception might be related to inadequate access to methods or a limited set of methods available. Although a family planning law has existed in Brazil since 1997 that guarantees access to all forms of contraception via the public health system, women have some difficulty in accessing, free of cost, the most recommended contraceptive method for their age and situation, and this is particularly the case for the poorest and the youngest women. In 2006, the PNDS data indicate that the provision of condoms, pills and other hormonal contraceptives comes mostly from drugstores (and sold over the counter without prescription) across all socio-economic groups.

Data on the age at first pregnancy were included in the survey from pregnancy histories for the last three live births and also with the intent of capturing information 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 socio-economic group), and in several cases the age at first pregnancy precedes age at first union. Again, for the upper socio-economic group, 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.

b. *Unwanted and mistimed fertility*

Examining the proportion of births that are wanted and not wanted also provides information as to what future fertility trends in Brazil may be. Although the country has a total fertility level below replacement, there is still a large fraction of this fertility that is unwanted or mistimed. This fraction would cause errors in population estimates if couples would approximate wanted fertility to the observed. According to PNDS 2006 data, the difference between wanted and unwanted fertility has decreased, from 28 to 11 per cent.[9] However, the level of wantedness has downward-biased estimates according to most methods put forward, and indeed is very hard to measure (Bongaarts, 1990; Casterline and El-Zeini, 2007). A 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, shows very high unwanted fertility estimates for Brazil. Table 4 shows unwanted fertility estimates from various methods (numbers drawn from Casterline and Mendonza (2009)). The percentage of unwanted births has decreased over time, yet 34 per cent of births in 2006 were unwanted (using Casterline and El-Zeini's method) when total fertility stood at a low of 1.8 children per woman. From these estimates one can infer that if couples could control fertility as they desired, then fertility rates in Brazil would be about 1.2 children per women. It is very difficult to accomplish the wanted number of children in the presence of high contraceptive failure and when women are subjected to gender-biased behaviours. However, as women get more education and poor populations have better access to contraceptives, fertility rates will most likely continue falling. As shown by Berquó and Lima (2009), the percentage of unwanted fertility is much higher among those living in rural areas, in the poorest regions and among the less educated, who are also those who stated they have more children than desired.

Another important issue is mistimed fertility. Although the cohort total fertility 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 in the long run also has impacts on the size of population. According to Berquó and Lima (2008), 28 per cent of all births in the five years preceding the 2006 survey were classified as mistimed (i.e., occurring earlier than desired). This figure is much higher for women under age 20 (43 per cent) and for lower order births (35 per cent of first order

births were classified as mistimed). Hence, the younger age pattern of current fertility would not have been the same (as the level of fertility) if women could time their pregnancies as they say they would like.

E. DISCUSSION

The explanations for the fast and sharp fertility decline in Brazil can be found in socio-economic as well as demographic factors as shown in the literature. Since the 1960s the growing participation of women in the labour market, the improvements in education (where women have reversed the gender gap in all educational levels in Brazil) and the advance of public policies accounts for the desire for lower and lower fertility. Among the demographic factors, the reduction of infant mortality, increased rural to urban migration and urbanization can explain several of the differentials in total fertility rates. From the perspective of proximate determinants, among those we are able to measure, the use of modern contraception (particularly female sterilization) have made it possible for women and men to realize their lower fertility preferences, although the use of abortion is widely acknowledged but not measured properly.

Nowadays, 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 have helped bring fertility rates down. Amongst other factors, 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, women are still a long way from sharing the responsibilities of bringing up children equally with men. The majority of women, mainly in the low socio-economic groups, still experience life course transitions 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 push them towards traditional life patterns 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 instead to be satisfied with one child. It is very common to hear in Brazil 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 level of completed schooling. Hence, for the short to medium term, this young fertility schedule will be the most common pattern for the majority of women in Brazil over the next 10 or 20 years.

Based on the data presented by socio-economic group and bearing in mind the limitations of the very fast decrease in economic and social inequalities, fertility in Brazil will continue its downward path in the coming years, perhaps 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 total fertility around the replacement level. This is indeed a probable scenario, and if this materializes, the implications for population growth in Brazil 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. Although there has been a reduction in income inequality, Brazil still has one of the highest levels of income inequality in the world.

NOTES

[1]Currently, Brazil accounts for one third of the Latin American population.

[2]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 in school for only one year.

[3]From 2005, the education system began a change to basic schooling of nine years by considering one year of pre-school as the first year of schooling. Because this change is recent and the population of interest is 15 years or over, in 2000 and 2007 it is assumed that this group has at best completed basic education.

[4]Although it is not recommended to include census and PNAD data in the same figure because of comparability problems, it is done so here to illustrate fertility trends by age groups and not to compare levels of ASFR among the different data sources.

[5]In another study the tendency of increasing adolescent fertility was already present in the 1970s (Barbosa, 2007) and thus is not a new pattern in the 1990s.

[6]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 also reflect different cohort experiences and have to be analyzed with extra care.

[7]In 2000, the rate of labour force participation for women aged 15 to 49 was 47.8 per cent and by 2007 it had increased to 66.5 per cent.

[8]For purposes of comparison, the scales for the figures are kept comparable to those presented earlier in the text.

[9]According to DHS data and using the ideal versus observed number of children, the observed total fertility in 1996 was 2.5 children per woman and the wanted total fertility was 1.8 children per woman. For 2006 the corresponding figures were 1.8 and 1.6, and the 2006 observed rate was equal to the 1996 wanted rate.

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TABLE 1. CHARACTERISTICS OF THE STUDY POPULATION AND TIMING OF CHILDBEARING, 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 Post-pone-ment*	*TFR*	*Women 15-49*		*Fertility average age*	*Index of Post-pone-ment*
		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
0-8 years of education										
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
9 or + years of education										
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 rates of women 30 or over to the rates for women in the 20-29 age group.

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

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

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

Source: 2006 Brazilian Demographic Health Survey.

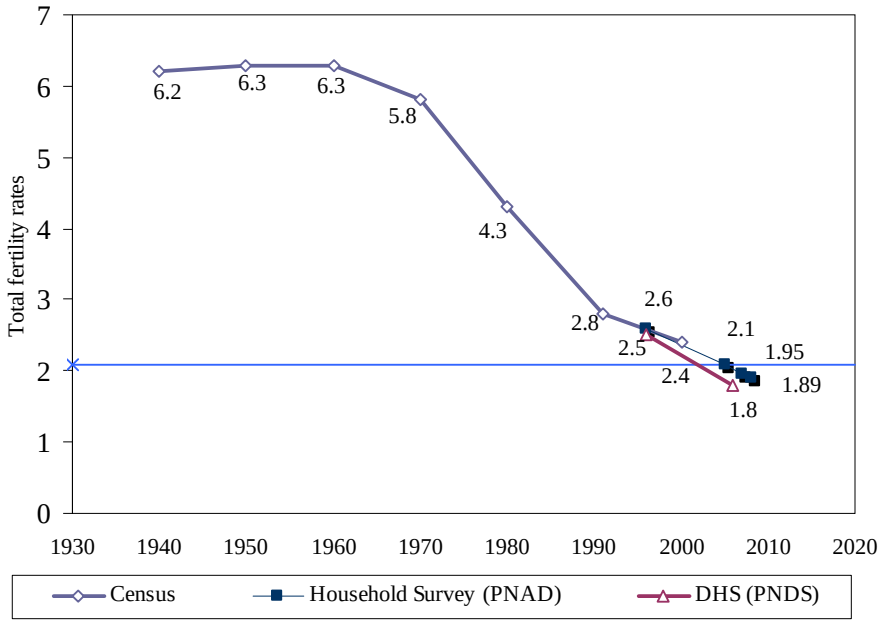
TABLE 4. UNWANTED FERTILITY ESTIMATES FROM DIFFERENT METHODS, BRAZIL, 1996 AND 2006.

	Percent of Births		*Total Fertility Rates*				
	Unwanted			*Unwanted*			*Wanted*
Year	*Ideal vs. Living*	*Casterline & El-Zeini*	*Overall TFR*	*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

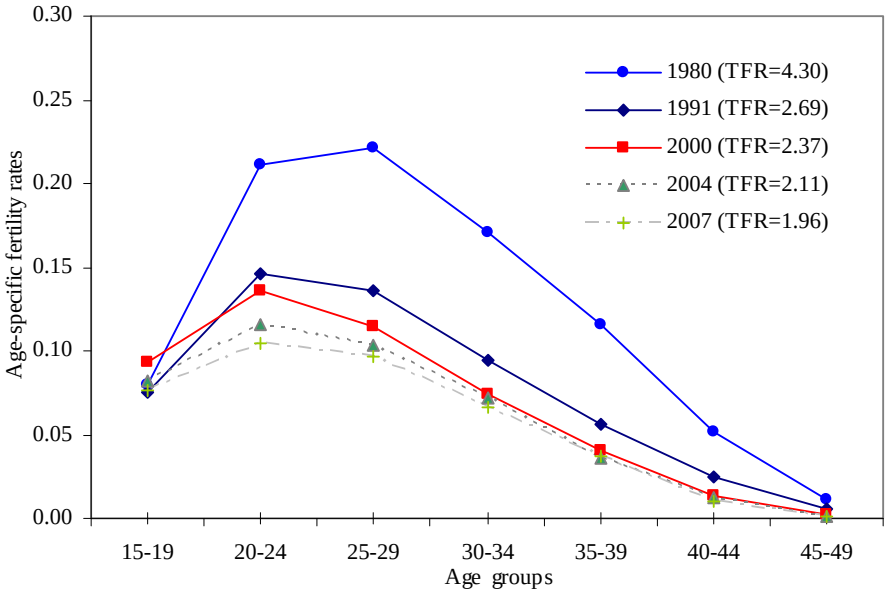
Source: Casterline and Mendoza (2009).

Figure I. Total fertility rate trends by several data sources and age-specific fertility rates, Brazil, 1980-2007

A- Total fertility rates, Brazil, 1940-2008



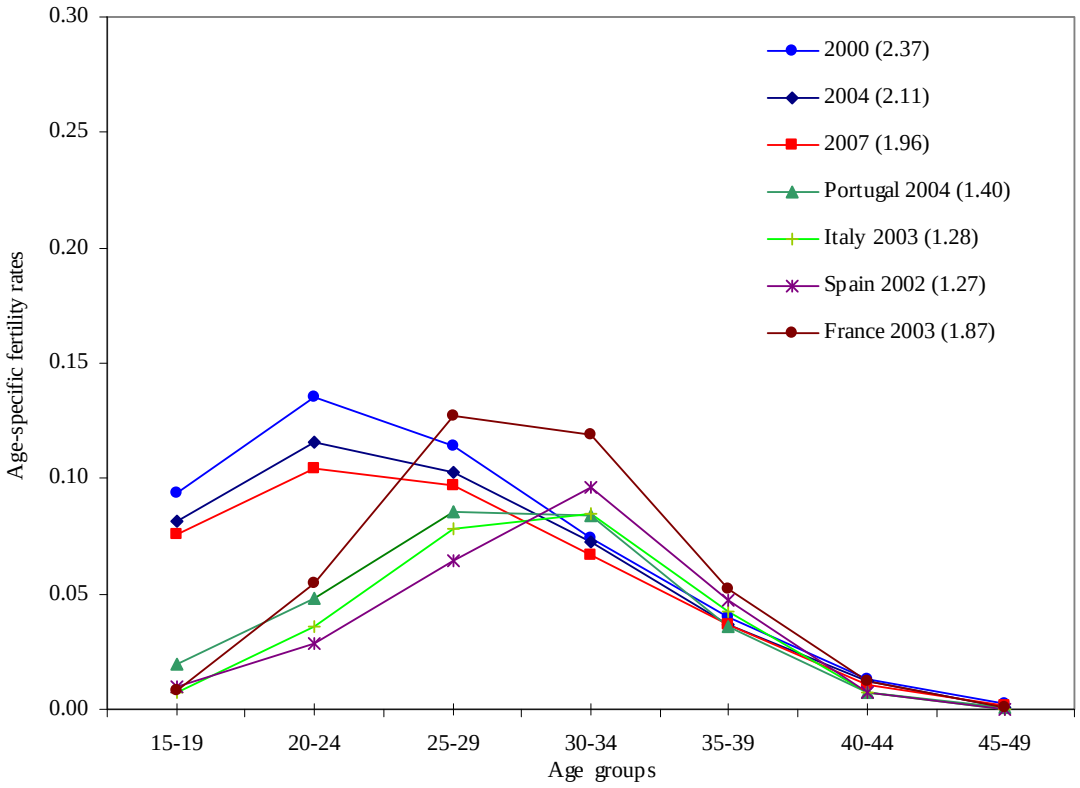
B- Age-specific fertility rates, Brazil, 1980-2007



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

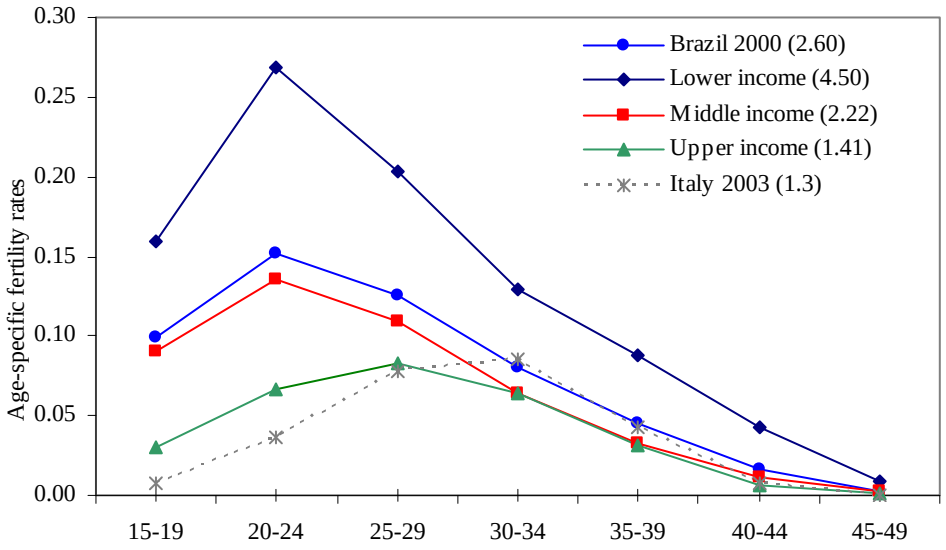


Sources: Brazilian Demographic Census of 2000; 2004 and 2007 National Annual Household Surveys (PNAD); PRB, World Fertility Patterns 2007.

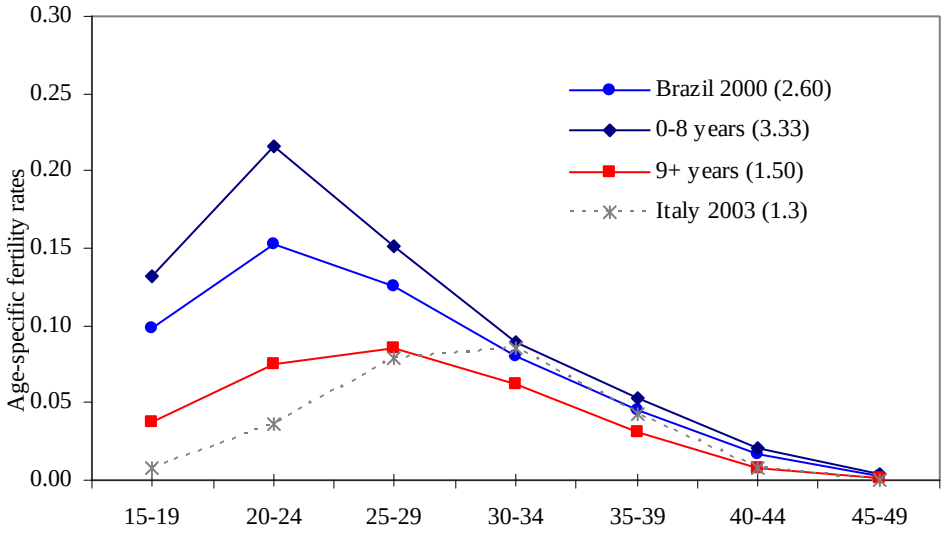
Note: TFR is shown between parentheses.

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

A- All women by income class



B- All women by schooling

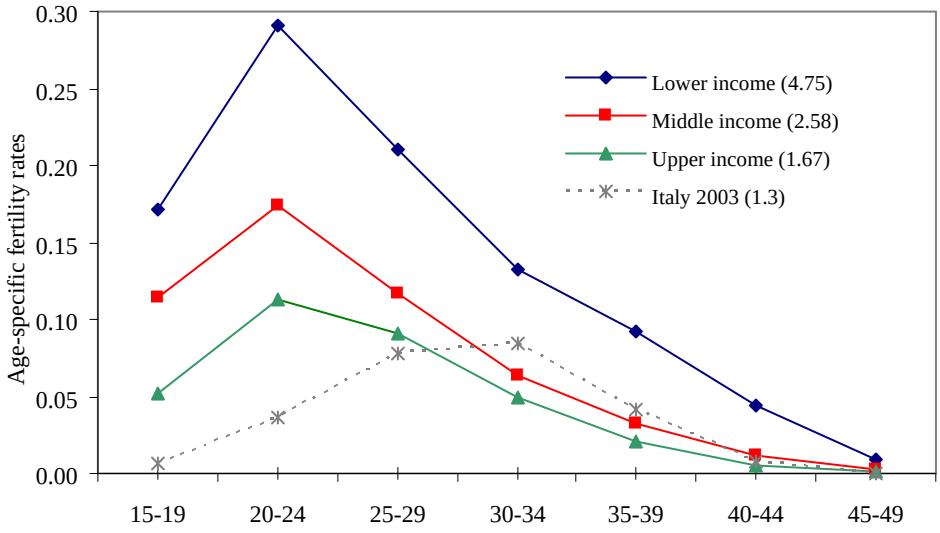


Source: 2000 Brazilian Demographic Census.

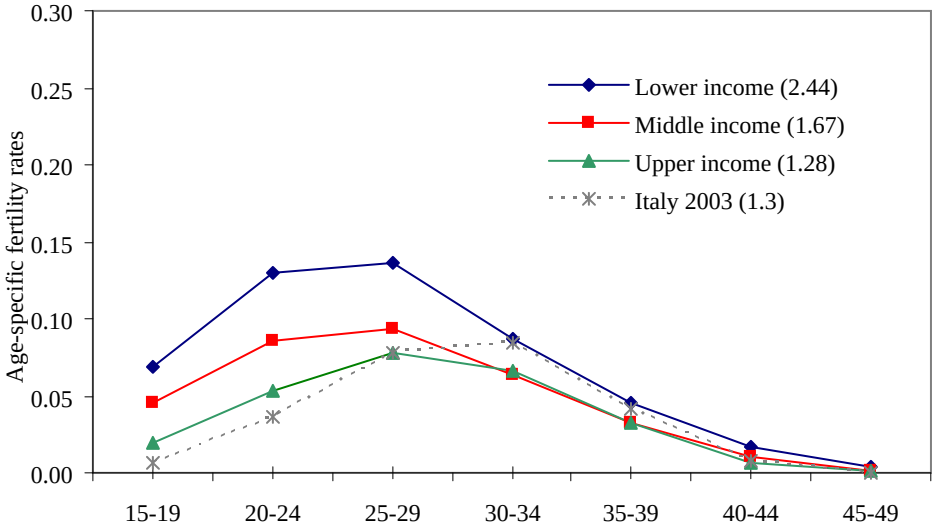
Note: TFR is shown between parentheses

Figure III. (continued)

C- Women with 0-8 years of schooling



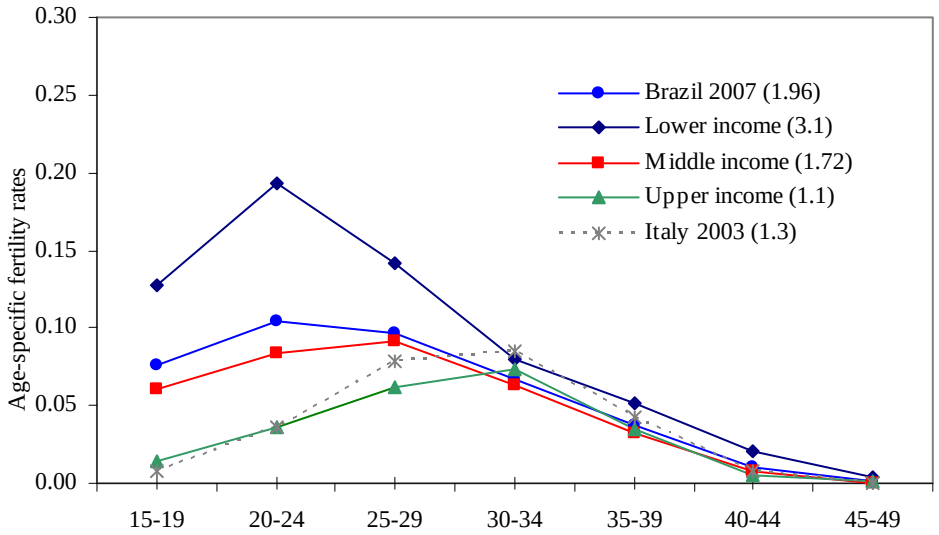
D- Women with 9 or more years of schooling



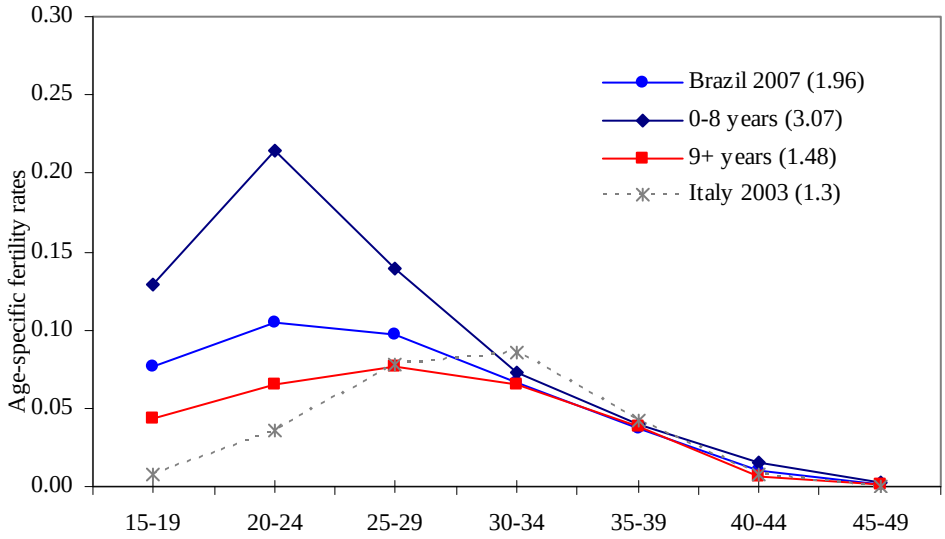
Source: 2000 Brazilian Demographic Census.
Note: TFR is shown between parentheses

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



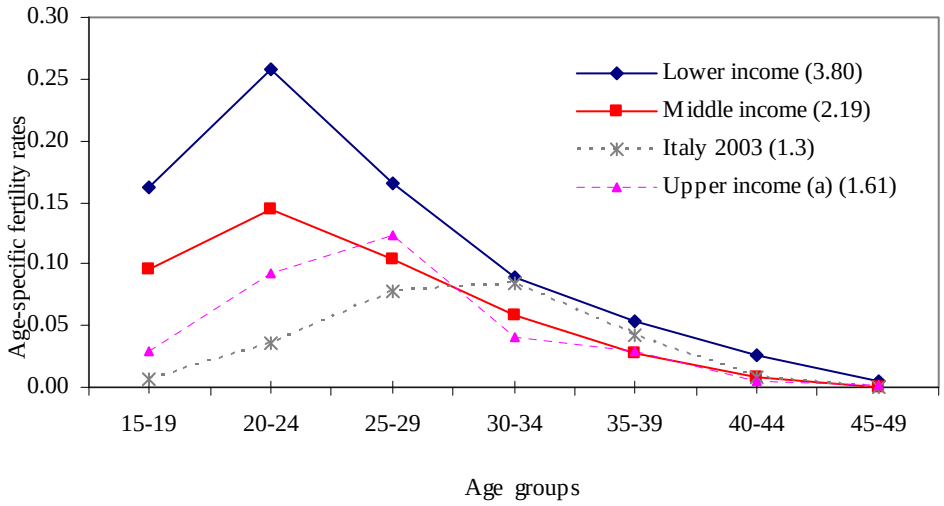
a) Data unreliable due to sample size variations

Source: 2007 National Annual Household Survey (PNAD).

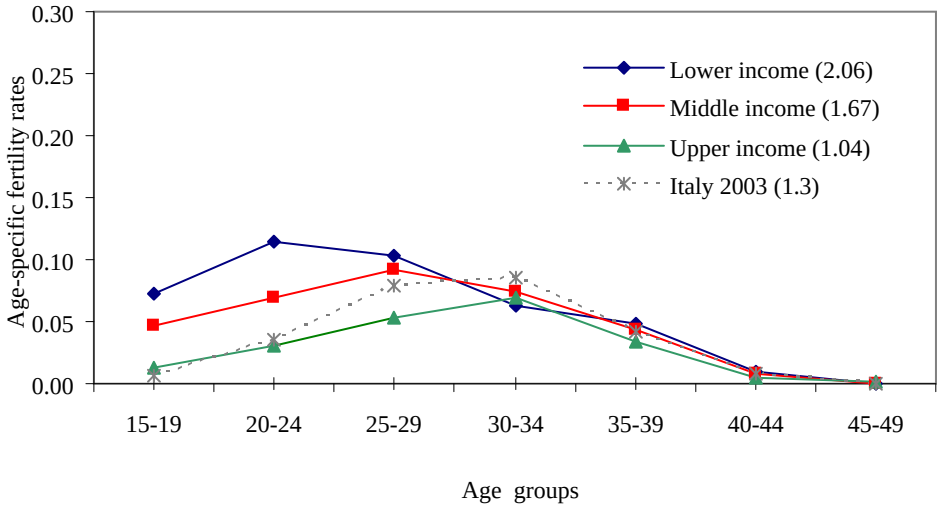
Note: TFR is shown between parentheses

Figure IV. (continued)

C- Women with 0-8 years of schooling



D- Women with 9 or more years of schooling



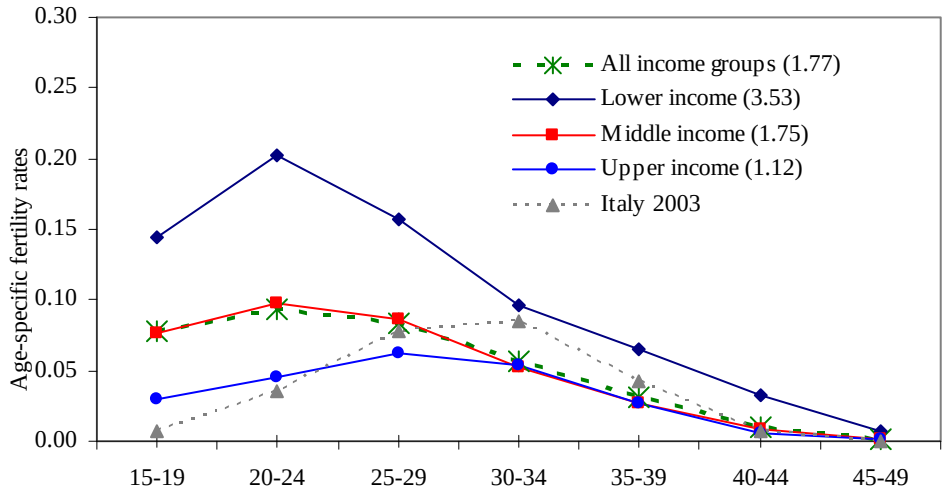
a) Data unreliable due to sample size variations

Source: 2007 National Annual Household Survey (PNAD).

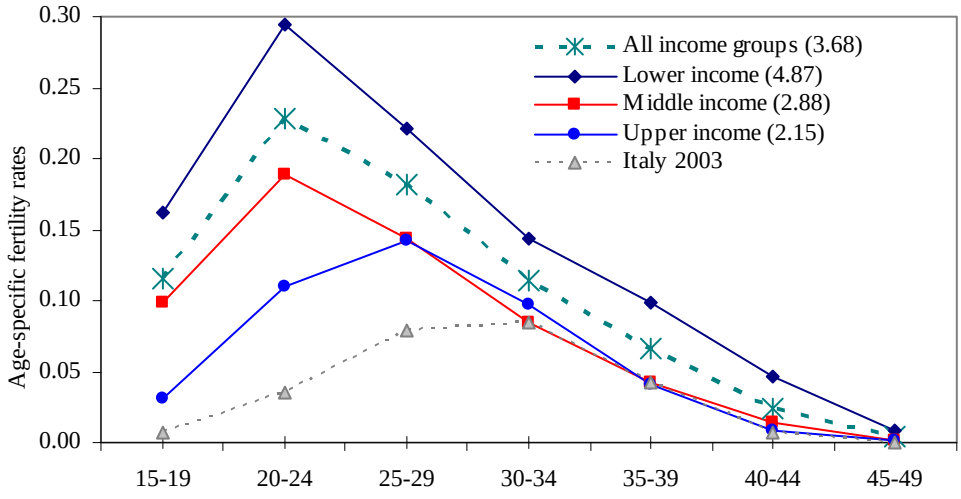
Note: TFR is shown between parentheses

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



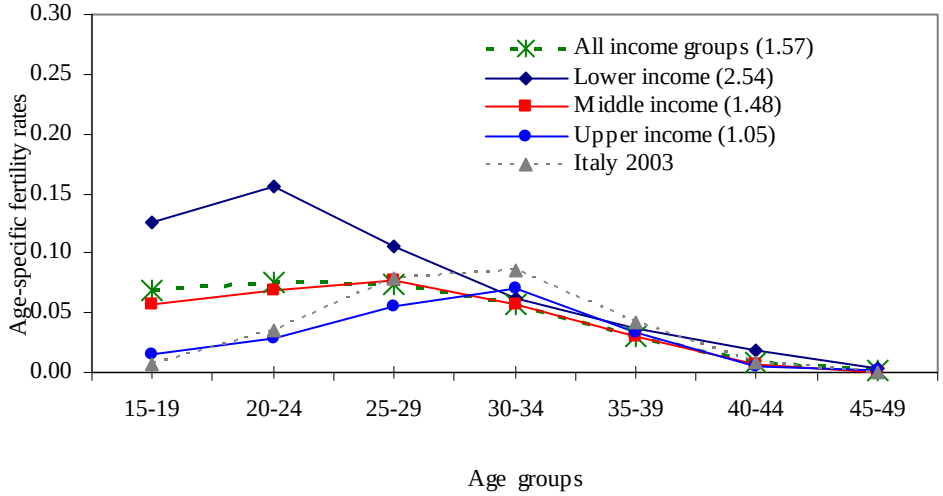
B- Women out of labour force, 2000



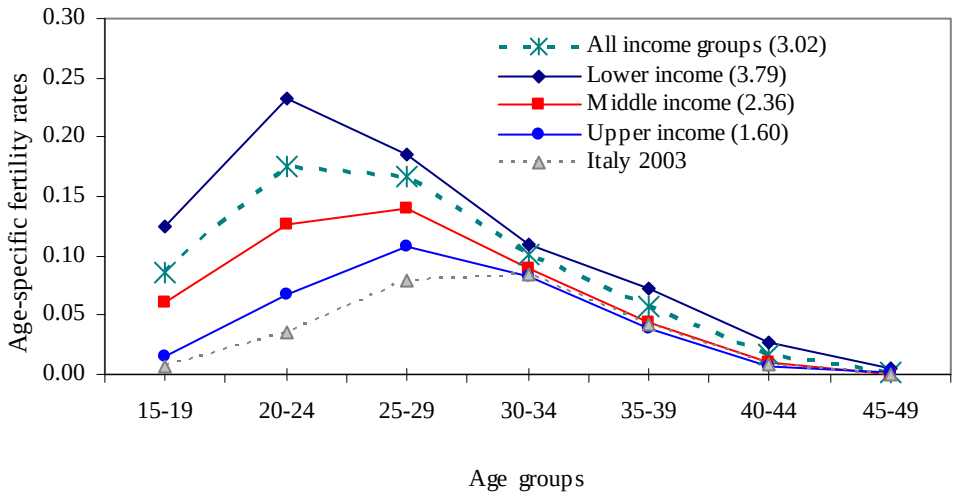
Sources: 2000 Brazilian Demographic Census and 2007 National Annual Household Survey (PNAD).
Note: TFR is shown between parentheses

Figure V. (continued)

C- Women in the labour force, 2007



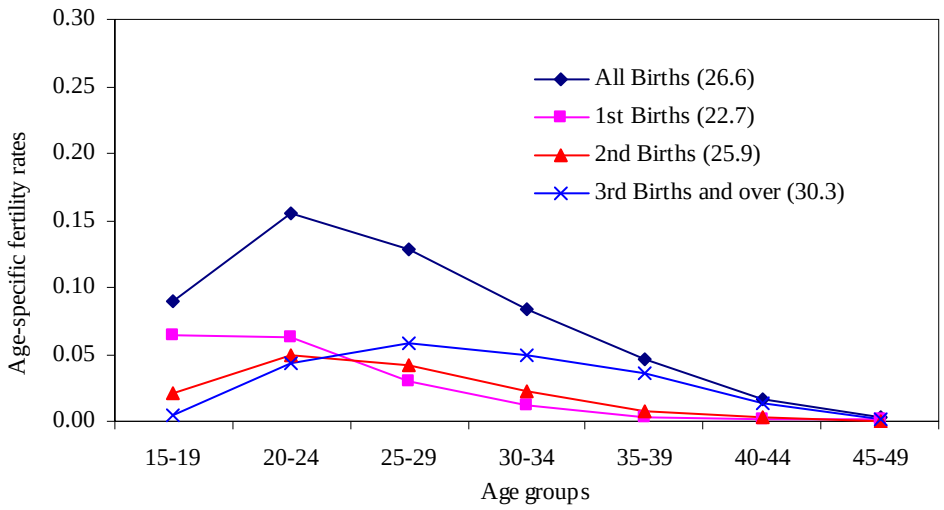
D- Women out of labour force, 2007



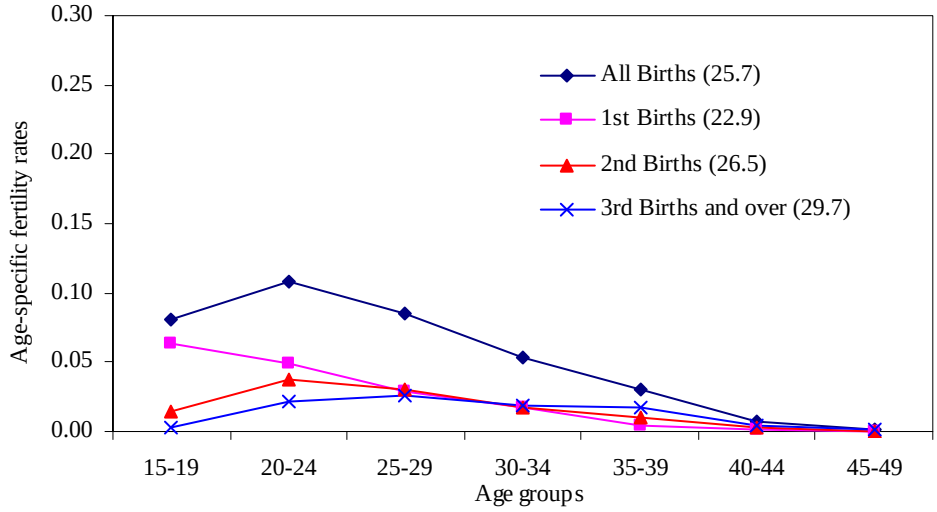
Sources: 2000 Brazilian Demographic Census and 2007 National Annual Household Survey (PNAD).
Note: TFR is shown between parentheses

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

A- All women, 1996



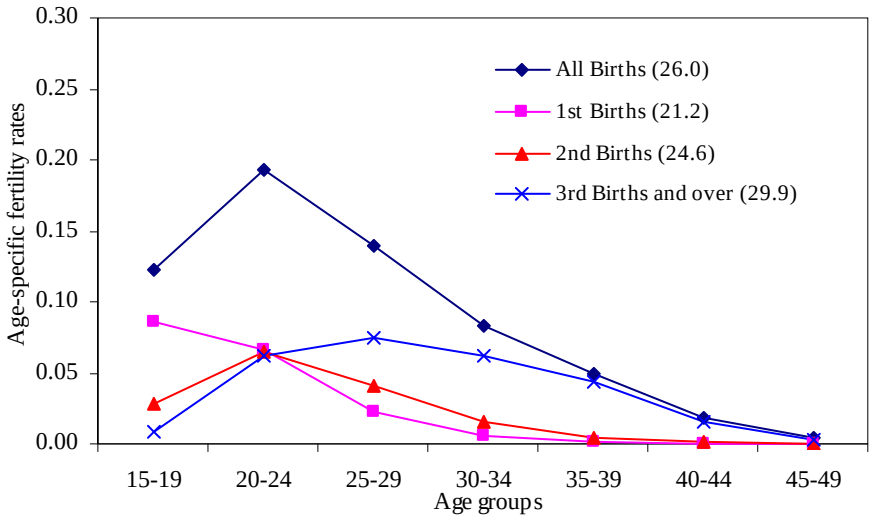
B- All women, 2006



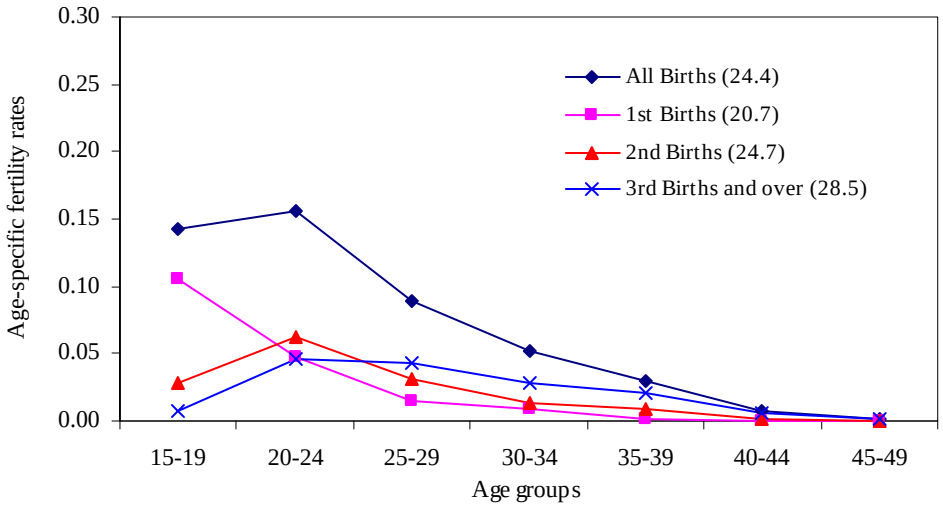
Sources: 1996 and 2006 Brazilian Demographic Health Surveys

Figure VI. (continued)

C- 0-8 years of schooling, 1996



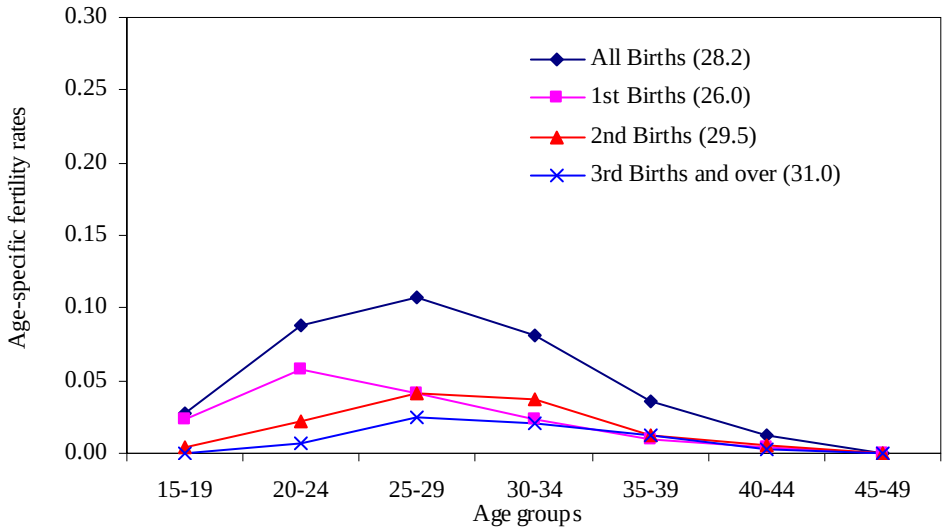
D- 0-8 years of schooling, 2006



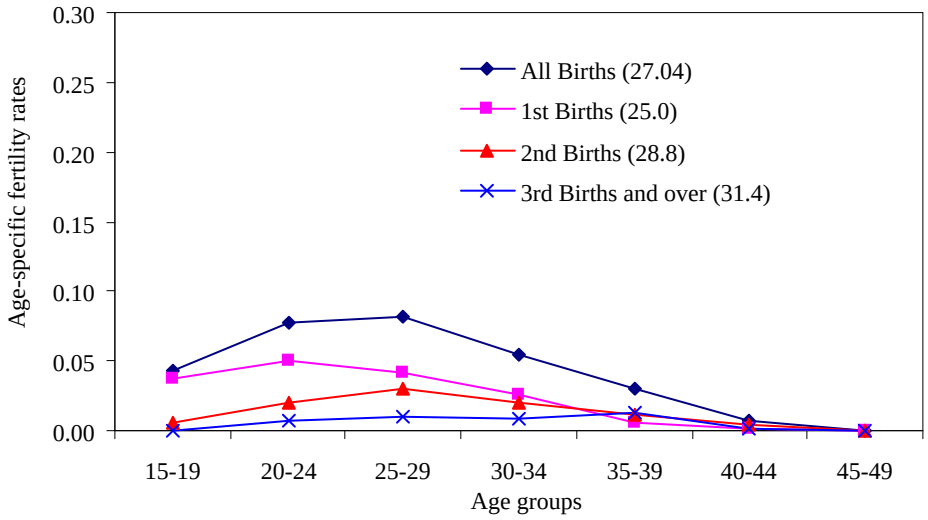
Sources: 1996 and 2006 Brazilian Demographic Health Surveys

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

A- Nine or more years of completed schooling, 1996



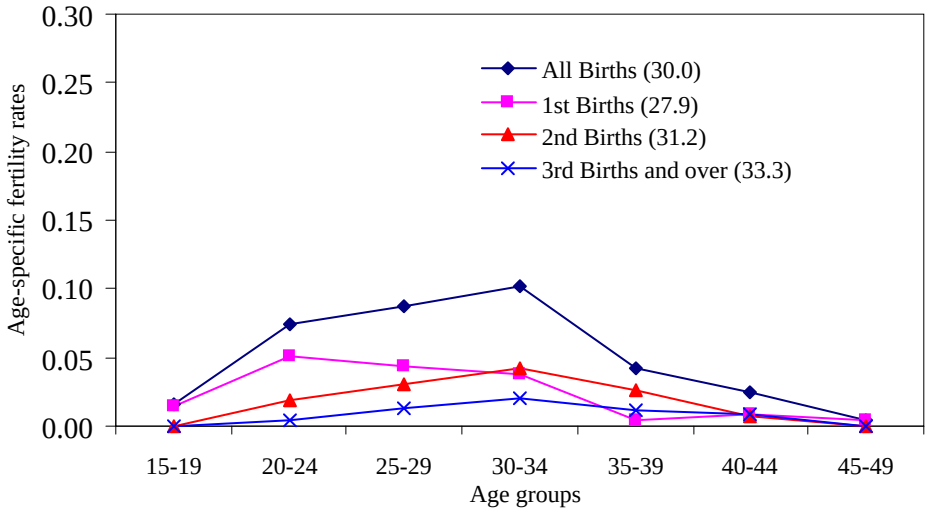
B- Nine or more years of completed schooling, 2006



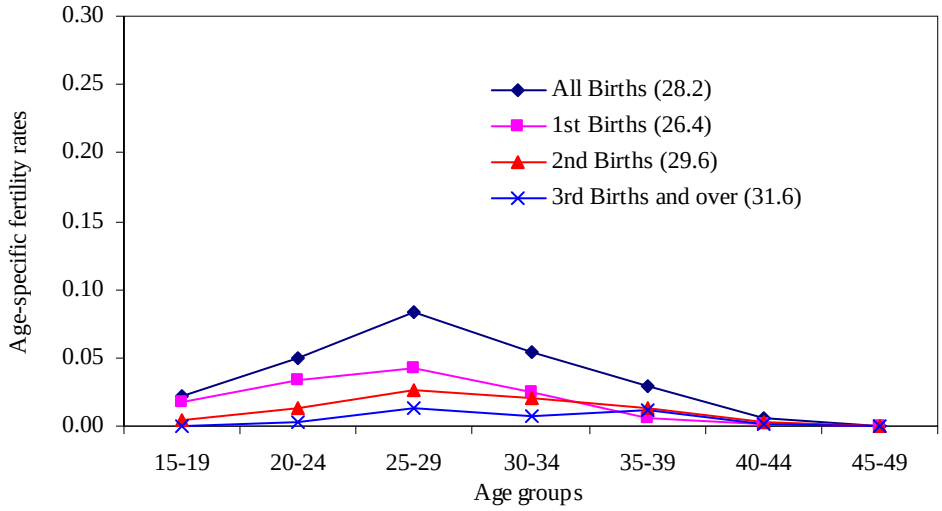
Sources: 1996 and 2006 Brazilian Demographic Health Surveys

Figure VII. (continued)

C- Lower socioeconomic group, 1996



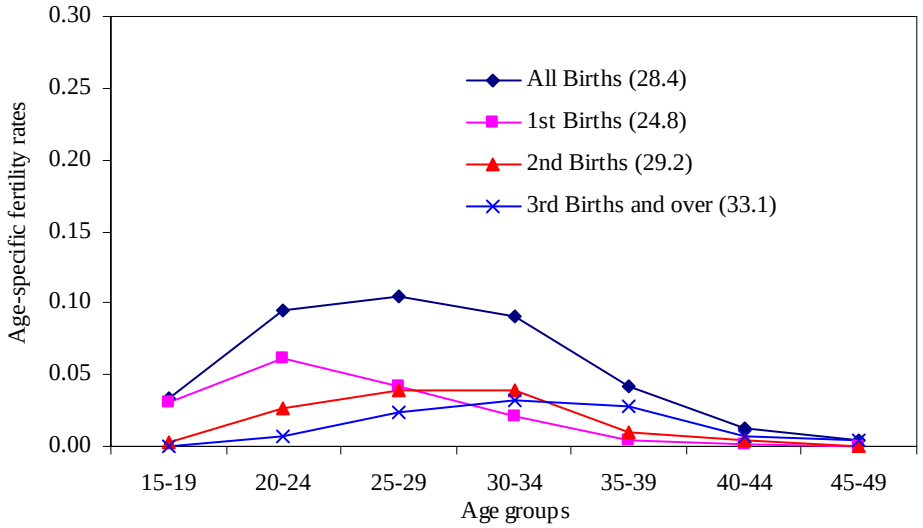
D- Lower socioeconomic group, 2006



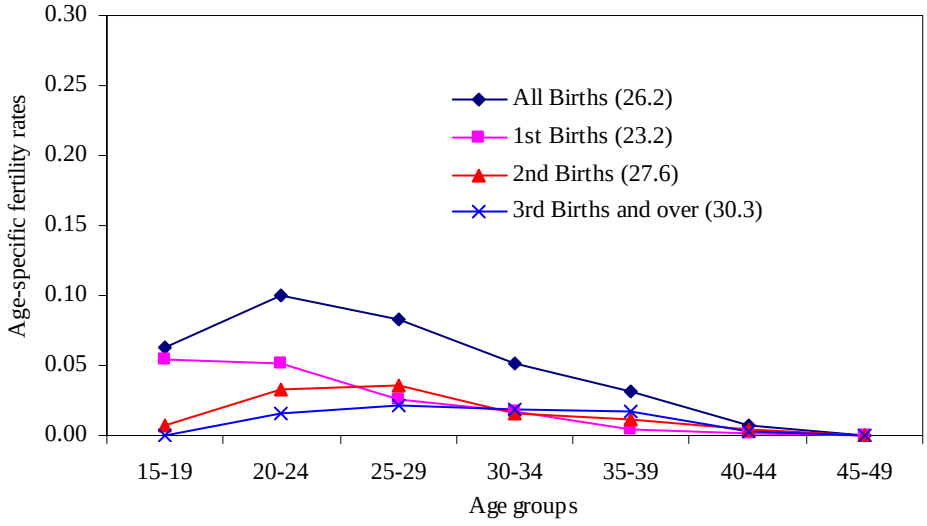
Sources: 1996 and 2006 Brazilian Demographic Health Surveys

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

A- Middle socioeconomic group, 1996



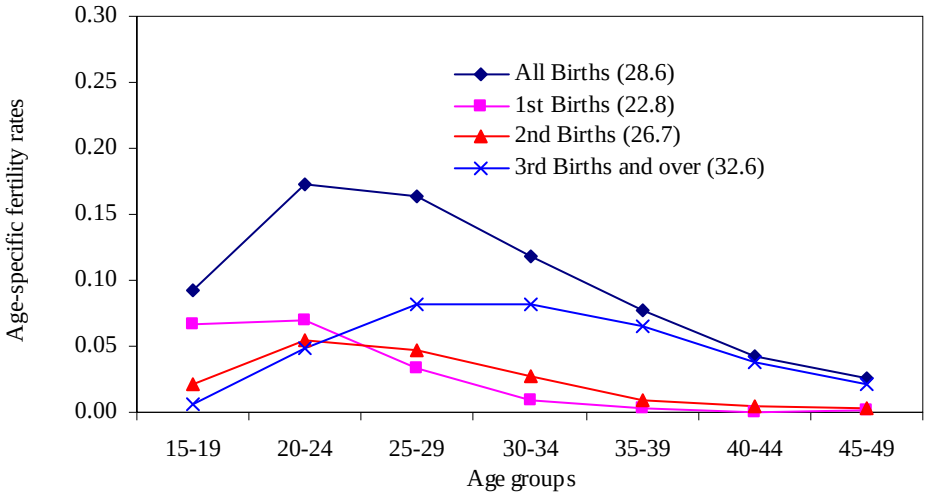
B- Middle socioeconomic group, 2006



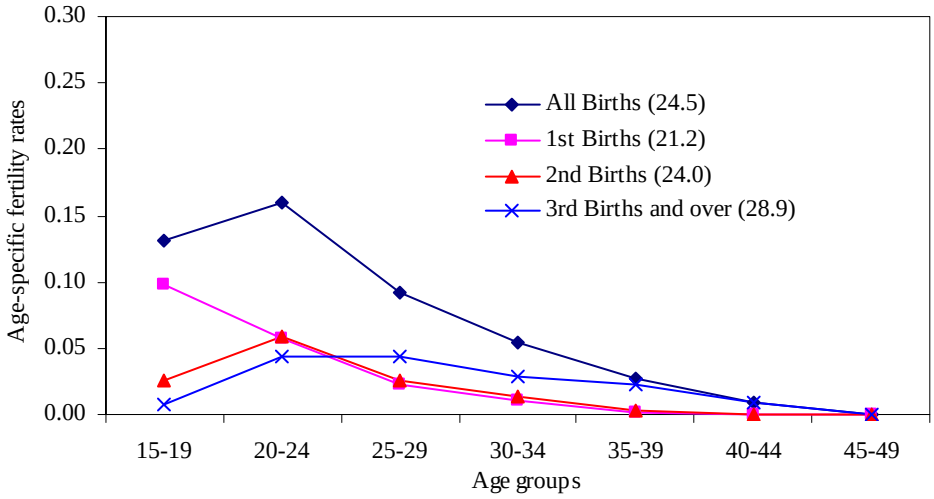
Sources: 1996 and 2006 Brazilian Demographic Health Surveys

Figure VIII. (continued)

C- Upper socioeconomic group, 1996



D- Upper socioeconomic group, 2006



Sources: 1996 and 2006 Brazilian Demographic Health Surveys