FERTILITY TRANSITION IN BRAZIL IN THE TWENTIETH CENTURY: A Comparative Study of Three Areas

by

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To my parents who had eight children and to my daughters, Carolina and Mariana. Together, they constitute strong evidence of the advance of fertility transition in Brazil but also that the determinants of reproductive behaviour go well beyond the rational factors.

ABSTRACT

The thesis discusses the main issues of demographic transition theory and uses this in a comparative analysis of fertility movements in three socio-economically different Brazilian regions over the twentieth century. The regions are the **Northeast** and the states of **Rio de Janeiro** and **Sao Paulo**.

The analysis points to a clear movement towards smaller family sizes in all regions. The movement started early in the twentieth century (or before) among white women living in Rio de Janeiro. These women were probably the better off. This behaviour was followed by white São Paulo women after about two decades and by the 1980s had reached most women independently of socio-economic status. The diffusion of the value of a small family and the legitimatization of contraception as well as some adjustment to mortality decline seem to have played an important role in this process.

Although fertility declined in all regions, a single pattern of fertility change, as delineated by the classical view of demographic transition theory, was not found. Fertility rates were always in movement, declining and increasing. The strategy used for the decline was, mostly, an earlier stopping of reproduction. However, later onset and longer spacing also became important, especially at a more advanced stage of the fertility decline.

A clear and single association between socio-economic variables and family size was not observed. Each variable played a somewhat different role in the reproductive behaviour of the three societies. Mass communication contributed to the diffusion of the small family size value. The process of diffusion resulted in a separation of socio-economic and intermediate variables. This points to the existence of a component of social pressure in the fertility decline.

Indications of a continuation of fertility decline in the near future are present. However, hints of a convergence in fertility rates and their stabilization at replacement level were not found. Fertility rates may reach levels below replacement in Rio and São

Paulo. Regional fertility differences are likely to continue. This suggests the presence of regional and individual preferences in the reproduction process or conscious choice along with some degree of institutional pressure.

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LIST OF ABBREVIATIONS

BC Birth Cohort

Bl Black

BENFAM Civil Society for Family Welfare

BSTEP Backward step

Ca Bongaarts index of abortion

C_c Bongaarts index of contraception

CLACSO Comission on Population and Development

C_m Bongaarts index of nuptiality

C_i Bongaarts index of post-partum non-susceptibility

C_{other} Indicator of effect of other factors apart from marriage on fertility

CPS Contraceptive Prevalence Survey

CV Coefficient of Variation .

CW Central West

DHS Demographic and Health Survey

DTMR Desired Total Marital Fertility Rate

EAP Economically Active Population

FSTEP Forward step

GNP Gross National Product

IBGE Brazilian Institute of Geography and Statistics

IPEA Institute of Economic Research

I_f Coale index for general fertility

I_g Coale index for marital fertility

IUSSP International Union for the Scientific Study of the Population

m The degree of fertility control

M A measure of the level of fertility

Mix Mixed Race Women

NA Not Applicable

Ne Northeast

NIHR National Investigation of Human Reproduction

No North

PNAD General Household Survey (Pesquisa Nacional de Amostra de Domicilios)

PROREPO Process of Population and Reproduction

RJ Rio de Janeiro

TF Total Fecundity

TFR Total Fertility Rate

TMFR Total Marital Fertility Rate

TNFR Total Net Fertility Rate

SEADE State Institute of Statistics

SMAM Singulate Mean Age at Marriage

So South

SP São Paulo

SPSS Statistics Package for Social Science

Sw Southwest

UNFPA United Nations Fund for Population Activities

WCFR Wanted Cohort Fertility Rate

Chapter 1
INTRODUCTION

1.1-INTRODUCTION

Brazilian fertility has declined dramatically during this century. This was preceded and accompanied by a reduction in mortality. It is generally accepted that the 1940s mark the onset of the substantial mortality decline while the second half of the 1960s saw the starting point of fertility decline. The gap between mortality and fertility reductions resulted in annual growth rates of 3.0% and 2.9% in the 1950s and 1960s, respectively. Fertility rates were almost stable before the decline. The Brazilian total fertility rate (TFR) was around 6.2 children in 1933 and dropped to 5.8 in the following ten years. It was stable until 1968[1] when it started to decline dramatically and reached a value of 3.5 by the first half of the 1980s.[2] The dramatic decline in fertility resulted in a reduction in the crude birth rate from 41 per thousand in the mid 1960s to 31 per thousand by 1980.[3] Population projections estimate a further decline for the crude birth rate to 19.5 per thousand by the end of the century and an annual growth rate of 1.3%.[4] Based on these trends, it is acknowledged that demographic transition is well advanced in Brazil.

The pace of fertility and mortality changes has varied substantially among Brazilian regions and social groups. Recent estimates point to a start of fertility decline in the Southeast region during the second quinquennium of the 1930s. Its TFR fell from 6.0

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[1] See Frias and Carvalho (1994), p 25.

[2] Oliveira and Silva (1986), p 215.

[3] See Merrick and Berquó, p 18.

[4] See IBGE, (1994), p 22.

in 1933 to 5.1 in 1943. This rate was stable during the following four quinquennia. Fertility decline resumed over 1963-1968 and the TFR reached 4.0 in 1970-1975. The remainder of the population showed high and even rising fertility rates until the 1970s. The Northeast TFR was 6.8 in 1970-75, for example.[5] By the late 1970s, mortality and fertility were already low in the South and Southeast regions while some regions, especially the Northeast, were still experiencing high fertility and mortality. Even within the more urbanised regions, fertility and mortality trends have been quite differentiated. It clear that as with other features of Brazilian economic and social history, aggregated data at national level mask important regional differentials. It is obvious that in a country of continental dimensions such as Brazil and with extreme socio-economic differences only a more disaggregated regional analysis can grasp the particularities of fertility movements.[6]

The challenge taken on in this thesis is to analyze Brazilian fertility decline and more specifically to understand why this experience has been regionally distinctive. The main part of the thesis consists of a thorough empirical analysis of fertility changes in three different socio-economic Brazilian regions during the twentieth century. This discussion looks for the similarities and differences in fertility trends and determinants in order to evaluate demographic transition theory as a framework capable of describing, explaining and predicting fertility trends in a specific society.

This chapter has six sections, this introduction being the first one. Before going on, a review of the literature about demographic transition theory is presented in section 1.2. The object of study and the main questions of the thesis are addressed in section 1.3. A brief evaluation of studies on Brazilian fertility trends and determinants is offered in section 1.4. Section 1.5 discusses the data sources and methodology and section 1.6 presents the thesis outline.

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[5] See Frias and Carvalho (1994), p 26.

[6] Brazilian characteristics at national and at regional levels will be described in Chapter 2.

1.2-THEORY OF DEMOGRAPHIC TRANSITION

In the Dictionary of Demography, demographic transition is defined as a description of the long term trends in fertility and mortality and a model attempting to explain them. Its theory comprises three parts: a description of fertility and mortality trends based on the experience of Western European countries; the construction of theoretical causal models explaining those trends; and predictions of future changes, especially for developing countries. Economic factors are widely considered to be the main determinants of both mortality and fertility decline.[7]

Demographic transition theory has been considered a very important demographic tool. Demeny, for instance stated that it is "the central preoccupation of modern demography."[8] Nevertheless, according to Wunsch (1984), it has not been able to give adequate theoretical orientation to demographic research.[9] Between these extremes there are many intermediate views. Since the first formulation attributed to Notestein (1945),[10] it has been modified. Nevertheless, fifty years after the first version a very basic question still remains without answer: is demographic transition a theory, a generalization, a framework for analysis or merely a concept? Is it a historical model, a predictive model or a simple descriptive term? Summarizing, a clear, generally accepted view of what this "theory" comprises does not exist.

The objective of this section is to discuss a number of issues of demographic transition theory focusing on its capacity as an analytical framework for understanding fertility movements. This is far from being an exhaustive review of the literature. According to the 1994 POPLINE, 2,355 publications recorded there refer to demographic transition and 506 specifically to fertility transition. This review centres on four points: the

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[7] See Pressat (1985), pp 52-3.

[8] See Demeny (1972), p 153.

[9] Quoted by Coleman and Shcofield (1986), p 11.

[10] According to Szreter (1993, p 661), demographic transition theory was born twice. It was previously presented by Thompson in 1929 and "it seems that it has suffered a stillbirth and it was reborn sixteen years later."

concept, the descriptive elements, the explanatory and the predictive models stated by demographic transition theory.

1.2.1-The Concept

Although the Dictionary of Demography just defines demographic transition as a description of the long term trends in fertility and mortality, Demeny linked demographic trends with modernization: "In traditional societies fertility and mortality are high. In modern societies, fertility and mortality are low. In between there is the demographic transition".[11] This leads to an immediate association of transition to decline and to modernization or, in other words, to the uniqueness of the direction of the fertility and modernization movements. Another point noticed in the Demeny statement is the lack of a precise definition of modernization. These are the points discussed in this sub-section.

Notestein (1945) is considered the first formulator of demographic transition as a theory. In its classic presentation, at the beginning of industrialization fertility remains uncontrolled and high while mortality declines due to improved food supplies and personal living standards which results in strong population growth. Fertility would fall as a combined result of full scale industrialization, modernization and mortality reduction. Modernization was first seen by Notestein as the key element in bringing about demographic transition. According to him, "...under the impact of urban life, the social aim of perpetuating the family gave way progressively to that of promoting the health, education and material welfare of the individual child; family limitation became widespread; and the end of the period of [population] growth came in sight."[12]

Five years later, Notestein was found advocating government-sponsored policies of family planning as an urgent priority for pre-transition countries. His commitment to proactive family planning programs resulted in important conceptual changes in his first approach. Fertility was no longer viewed as the ultimate dependent variable, the final outcome of economic and cultural changes, and came to be viewed as something that

[11] See Demeny (1972), p 153.

[12] Quoted by Szreter (1993), p 662.

could and should be changed by interventionist policies designed to work in advance of other measures aimed at promoting social, economic and cultural changes. His words in 1948 were, "Fertility control is not a substitute for other ameliorative; instead, it is a means that will assist in making ameliorative effort successful-*indeed it may turn out to be a necessary condition for such success.*"[13] A similar point of view is found in Davis (1949). Both state clearly the inversion of the variables in the model.

This inversion of dependent and independent variables is very well analyzed by Patarra (1973), Hodgson (1988) and Szreter (1993) and according to them has its roots in a particular conception of social science as a guide for policy. According to Patarra, this inversion leads to an inconsistency in the conception of demographic change. At the same time that the phases of demographic change are seen as an inevitable response to the phases of economic development, an inversion of the process for areas that were yet in the first phase was suggested. This refutes demographic transition as a theory as the evolution described by the classic view would be valid only for Western European countries. Thus, the power of the theory is restricted to a historical synthesis.[14] A similar point of view better elaborated is found in Szreter. According to him, the first presentation of the classic view of the theory in 1945 already included a pocket political manifesto against the demographic dangers of high population growth.[15] Thus, at that time, the third phase of demographic transition (the fertility decline) was already seen as a therapy against the misery and the Malthusian crises instead of being regarded as one of the several alternatives feasible for fertility.

A further point noticed in the thesis' review stresses the relatively little attention given to mortality and even to the interactive effect of fertility and mortality on population growth by the demographic literature. Transition theory has often come to mean fertility transition rather than along with mortality. A search among the publications inventoried by POPLINE points to only 75 titles mentioning mortality among the 2,356 titles about

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[13] Quoted by Szreter (1993), p 674 with his emphasis.

[14] See Patarra (1973), pp 89-93.

[15] See Szreter (1993), pp 666-70.

demographic transition. On the other hand, 506 titles refer to fertility studies. The relative concentration of academic effort on fertility might be associated with the absence of cultural resistance to mortality change. Mortality reduction is always welcomed in any society. Thus, the time lag between mortality and fertility, *the transitional phase*, is a cultural subject which depends upon reproduction. This is an ambiguous issue. All human societies welcome reproduction in some way, it is a matter of their replacement. Nevertheless, it is recognised that population cannot grow unlimitedly. Hence, demographic transition became a matter of <u>how to moderate fertility</u>.

A new concept, *fertility transition*, has gained popularity in the demographic literature since 1974. It has been accompanied by a decline in of the use of the expression *demographic transition* theory. This was shown by van de Walle, based on a search of the POPLINE records during 1984 and 1992. According to him, *fertility transition* has a more precise meaning as it is defined as the passage from *natural* fertility to *controlled* fertility. *Natural* fertility was defined by Louis Henry (1961) as the absence of parity specific control and *controlled* fertility as the <u>purposive</u> stopping of childbearing conditional upon the couple's previous fertility history.[16] It is characterized by the intentional effort of a couple to <u>stop</u> childbearing with a given number of children. It does not necessarily involve control over <u>spacing</u>. The appearance of the concepts of *natural* and *controlled* fertility seems to have inspired Coale to make a statement of the three pre-conditions for the advent of *controlled* fertility behaviour which defines *fertility transition*. They are:

1-Fertility control must be within the calculus of *conscious choice*. Potential parents must consider it an acceptable mode of thought and form of behaviour to balance advantages and disadvantages before deciding to have another child;

2-Reduced fertility must be advantageous to individual couples;

3-Adequate means of control must be known and available.[17]

The three Coale conditions define *fertility transition* as a shift in the mechanisms of reproductive process control from <u>institutional arrangements</u>, society's marriage system,

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[16] See van de Walle (1992), pp 487-8.

[17] See Coale (1973), p 65.

family organization, property systems to individual choice, motives. Much empirical and theoretical effort have been put on the development of the determinants of marital fertility decline but the mechanisms of normative regulation of individual behaviour have not been considered. The new concept and approach, according to Szreter, are subject to the same methodological limitations as those of demographic transition. The process of change was again reduced to unidirectional path, from *natural* fertility to *controlled* fertility, and associated with the passage from a *traditional* society to a *modern* one.[18] Empirical evidence pointed out by Blake (1985) and Wilson et al (1988) suggests that there is no such single *traditional* society, so too there is no single form of *natural* fertility that can be distinguished from *controlled* fertility.

Another point raised in this review is about the unique importance given to the *stopping* behaviour by the definition of *controlled* fertility. Indexes seeking to measure the degree of control were developed by Coale and Trussell (1974). Actually, they indicate the existence of an early *stopping* of childbearing compared to the fertility of the Hutterites which is an Anabaptist religious group living on the High Plains of North America whose fertility is widely used as a benchmark for maximum fertility These indexes ranged from 0 to 2.5 and values greater than 0.25 are assumed to indicate the existence of fertility control. Widespread and even intentional attempts to *space* births without recourse to stopping are not regarded as *controlled* fertility.

Historical examples given by Gaunt (1973) and Dupâquier and Lachiver (1969) among others suggest that *spacing* was an important strategy for fertility *control*.[19] By the same token, Lesthaeghe (1980) showed that longer breastfeeding and longer post-partum sexual abstinence in Nigeria were conscious birth spacing practices in order to keep fertility lower than the maximum biological. These examples illustrates the ambiguity of the concept of *natural* fertility and stress the importance of *spacing* as an element of human reproduction. However, the importance of *stopping* behaviour during fertility decline is not questioned at all.

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[18] See Szreter (1993), note 118.

[19] Quoted by Wilson et al (1988), p 5.

1.2.2-The Descriptive Model

The central point of the descriptive model of demographic transition is the notion of three phases of population growth as a result of fertility and mortality trends. This notion assumes an onset, a duration and a termination of demographic transition. Also it implicitly brings the idea of homogeneous mortality and fertility rates in the equilibrium phases, the first and third, and differential mortality and fertility in the transitional phase. The idea of the three phases has been so convincing that they have provided the basis for the United Nations, World Bank and many national population projections.

The logistic function theory developed by Verhust in 1874 already implicitly contained the notion of the three phases of population growth. It delineated an unidirectional population movement: the passage from a situation of equilibrium characterized by high fertility and mortality to another situation described by low fertility and mortality.[20] In the demographic literature, Thompson (1929) and Landry (1934) are considered the predecessors of demographic transition theory. Both classified populations into three groups on the basis of their different combinations of fertility and mortality and forecast the possibility that a *new regime* of lower fertility and mortality will spread throughout the world. They did not regard their typology as a theory but they presented it as an ongoing global generalization. Notestein (1945) presented a typology of populations as an introduction to a review of world population projections. His three types are very similar to those of Thompson (1929) and Landry (1934). He also projected a universal trend in fertility behaviour.[21]

According to Watkins, the studied model describes long term population trends in an imprecise way: neither measures of fertility or mortality, nor the scale, nor the length of the lag were consistently specified.[22] It is assumed that fertility was high in pre-transition

[20] Quoted by Patarra and Ferreira (1986), p 5.

[21] Similar ideas stressing the three stages were also presented by Davis (1945), Blacker (1947) and Cowgill (1949).

[22] See Watkins (1986), p 420.

time without any specification of how high.[23] There is evidence that fertility rates were much lower than the maximum biological in both Western European and in Third World countries in their pre-transition times. The findings of the European Fertility Project[24] show that in Western Europe, by 1870 before the fertility decline, overall fertility levels measured by I_f values at national levels ranged from 30% to 50% of the Hutterites fertility. The lower rates can be partially explained by late marriage. The levels of marital fertility were not so high as would have been expected as well. Marital fertility measured by I_g in 1870 was below 60% of the Hutterites in 30 European provinces and in seven provinces below 53%.[25]

The 1960s is considered to represent the onset of fertility transition in most Third World countries. At that time, their total fertility rates were much lower than the 15.3 stated by Bongaarts (1976) as the maximum level of natural fertility. For instance, the maximum value for total fertility rates in Latin America in 1960 was found in Honduras, 7.4.[26] Average total fertility rates for African regions in 1965-70 did not exceed 7.0 children.[27] Lesthaeghe (1980) points out that most societies have generated arrangements through which fertility is regulated independently of the phase of demographic transition. Based on historical records for Western Europe and Nigeria, he concluded that late marriage in Europe and polygamy in sub-Saharan Africa were important elements of their social structures and prevented rapid population growth.

The descriptive model implicitly assumes homogeneity in fertility levels in pre-transition times as well. Nevertheless, there is abundant evidence of large regional and

[23] Coale (1973, p 64) arbitrarily defined high fertility as total fertility of over 5.0 and low fertility as total fertility of less than 4.0.

[24] The European Fertility Project was supported by the Princeton University and provided detailed statistics on fertility (marital and non-marital) and on marriage patterns at the macro-level for administrative units such as nations, provinces and districts. The results have supported many amendments to theory of demographic transition.

[25] See Watkins (1986), p 429.

[26] Data presented by Zavala (1990), p 26.

[27] See Fredman and Blanc (1991), p 6.

socio-economic differentials in pre-transitional societies. The findings of the European Fertility Project indicate that in a few Belgian *arrondissements*, the I_g in 1870 was above the Hutterite level, while, as noted above, in 30 provinces it was below 60% and in seven provinces below 53%.[28] Cohort fertility rates also point large regional variations in Europe. For instance, these rates for women who finished their reproductive life in 1870 ranged from 6.1 in Scotland to 3.4 in France. Total fertility rates in Latin America in 1960 ranged from 7.4 in Honduras to 5.0 in Chile.[29] In African regions in 1965-70, the highest fertility was found in Eastern Africa, 6.9, and the lowest in the South, 5.9.[30] A major source of these differences was the variation in the proportion married among women of childbearing age. However, discrepancies were also substantial in pre-modern marital fertility though the causes are less clear. Differences in breastfeeding practices, post-partum sexual abstinence and variations in fecundability, possibly caused by nutritional differences, are plausible determinants. There is also evidence of parity specific forms of marital fertility control practised by the bourgeoisie in Geneva, the residents of the English parish of Colyton, by French and Hungarian peasantry in the eighteenth century or the first half of the nineteenth and by many European Jewish populations.[31]

Another point raised here refers to the sequence of the *three phases* stated by the classical view of demographic transition. The sole movement allowed to fertility, or even mortality, is an <u>irreversible</u> decline until very low levels are reached. Nevertheless, Reed (1945), one of the pioneers of the classical view, confined the "inevitable" fertility decline to a simple working hypothesis. ***"There is no empirical evidence that every population everywhere independently of its size, habitat and cultural values moves from an unstable situation to a rational situation of equilibrium."***[32] The empirical evidence indicates that

[28] See Watkins (1986), p 429.

[29] Data presented by Zavala (1990), pp 25-6. Argentina and Uruguay were not considered as they were in advanced stage of fertility transition at that time.

[30] See Fredman and Blanc (1991), p 6.

[31] Quoted by Cleland and Wilson (1987), pp 11-2.

[32] Quoted by Patarra (1973), p 90, emphasis added.

many countries experienced predecline fertility increases either in Western Europe or in the Third World. For instance, Woods shows that even in England and Wales, which is considered the classic example of demographic transition, the pattern of change differed from that illustrated by the descriptive model. Fertility increased in the late eighteenth and early nineteenth centuries and declined thereafter until the 1940s with a short interruption in the 1850s and 1860s.[33] Lee (1975) found annual fluctuations in births in pre-industrial England due not only to nuptiality and mortality but to genuine fluctuations in marital fertility.[34] Fertility measures estimated by the Princeton Project (I_f) and analyzed by Dyson and Murphy suggest that overall fertility was generally rising before about 1880 or 1890 in European countries. For some countries, for instance Denmark, there are reasons to believe that the increase in I_f extended back for some time. According to Dyson and Murphy, changes in marriage explained more of the pretransition fertility rise in Western Europe than did increases in marital fertility.[35]

Some developing countries also showed a rise in their fertility before the considered onset of fertility transition. The strongest evidence for sustained past rises was found by Dyson and Murphy in Latin America and Egypt, Tunisia, Jordan, Malaysia, South Korea, Sri Lanka, Thailand and Fiji.[36] Cleland found similar evidence for Bangladesh.[37] According to Dyson and Murphy, the major predecline increases observed in Latin America and the Caribbean seem to have resulted from a surge in marriage rates at younger ages combined with more frequent marriage at later ages as a result of mortality decline (the widowhood effect). Zavala confirmed these findings and included the reduction of involuntary sterility in the explanation of the fertility increase in Latin America.[38] In Sub-Saharan Africa declines in postpartum abstinence allied with changes

[33] See Woods (1987), p 283.

[34] Quoted in Lesthaeghe (1980), p 544.

[35] See Dyson and Murphy (1985), p 401.

[36] See Dyson and Murphy (1985), pp 405-7.

[37] See Cleland (1994), p 243.

[38] See Zavala (1990), pp 15-6.

in breastfeeding and reductions in the prevalence of venereal disease seem to be the most likely factors behind past fertility rise. An important conclusion is that such increases as well as those observed in Western Europe do not seem to be mere occasional fluctuations. They appear to be closely associated with subsequent decline and have even exhibited some similarities in timing. Based on this, Dyson and Murphy suggest that fertility rise should be viewed as a central phase of the onset of transition. Therefore, the full understanding of the onset of fertility transition requires a historical perspective and also the use of a framework for understanding fertility which allows the measure of the several components of fertility as does the Bongaarts framework.[39]

This evidence of some fertility instability in the past makes it difficult to specify precisely the *onset* of fertility transition. It is also difficult to define the *end* (if there is one) as it was not stated by theory at which fertility rates transition would be reached or concluded. Consequently, the *duration* of the transition or the achievement of the third phase is also imprecise. Knodel and van de Walle, comparing the experience of Sweden and Taiwan, tried to be more precise about matters of *onset* and *end*. They concluded that once fertility starts to fall below the predecline levels, these trends continue virtually <u>uninterrupted</u> until <u>radically different</u> levels are achieved.[40] Their definition points to the irreversibility of the decline and fertility stabilization but it does not assume homogenization of fertility rates.

Chesnais (1992), based on a long time period series for developing countries, validates the descriptive model of theory of demographic transition for these countries based on these assumptions of irreversibility of the fertility decline and stability of fertility levels at some point. Although following the same European mechanisms with mortality decline preceding fertility, he recognises that both declines have been much faster than they were in Western Europe. In fact, he shows that the higher fertility was before the decline, the more rapid was the fall. The rapid fertility decline was attributed by Leridon et al (1987) to the "contraceptive revolution" observed in developing countries since

[39] See Dyson and Murphy (1985), pp 422-33.

[40] See Knodel and van de Walle (1979), pp 232-3.

1964. This would be, according to Ryder, a consequence of imposed modernization. Fertility declines without much change in cultural values.[41] Women get sterilized after a large number of children but still marry at young ages. This results in a incomplete transition, according to Zavala which is based only on changes in one stage of the family constitution process, the stopping.[42]

The discussion of *duration* relies upon an *end* for fertility transition. Patarra (1994), based on the CELADE projections for Latin America, concluded that these countries will be completing their transition around the year 2025, assuming fertility at replacement levels at the end of transition. Chesnais considers that countries whose crude birth rates are between 20 to 30 per thousand had fully completed their transition. Those whose rates are below 20 per thousand are classified as *post-transition* countries.[43] The conclusion presented by Patarra assumes stability on fertility rates at the replacement level and that stated by Chesnais introduces a new phase, the *post-transition*. The empirical evidence indicates that many countries have already reached fertility rates at the replacement level, some well below.[44] Nevertheless, there is no evidence to suggest that demographic transition is over anywhere. There is no theoretical or empirical basis for this assumption. Bumpass, for instance, believes that fertility transition will continue in the West for the foreseeable future.[45]

Some empirical evidence actually conflicts with the idea of the *end* of fertility transition or even its stabilization. For instance, marital fertility declined in France from the 1780s to the mid nineteenth century when it increased until 1880 and then declined again. Wrigley (1981) interpreted the French case as a result of two transitions. The first decline was perhaps a response to mortality decline and the second one was simultaneous

[41] See: Ryder (1983), pp 22-3.

[42] See Zavala, p 27.

[43] See Chesnais (1992), p 92.

[44] Italy, Spain, Portugal and Greece are experiencing fertility rates two thirds below of the replacement levels (around 1.3).

[45] See Bumpass (1990), p 493.

with the main fertility decline elsewhere in Europe. Other empirical evidence unfavourable to the idea of fertility stabilization is the fertility rise that took place under the Nazi Government in Germany and the 1950s and early 1960s baby boom observed in the United States, Canada, Australia, New Zealand and in other Western European countries. Efforts to raise fertility have been promoted in France, Sweden and Singapore. The Swedish TFR rose from 1.6 to 2.1 between 1984 and 1990.[46] Cohort fertility rates referring to cohorts born between 1930 and 1960 in 14 Western European countries presented by Sardon indicate steady fertility decline there except in Sweden. The decline was regionally differentiated. Rates ranged from 2.6 in France to 2.0 in Luxembourg among the cohorts born in 1930 and from 2.1 in Sweden to 1.6 in Italy among the cohorts born in 1960.[47] These findings show that even cohort rates are not so stable.

In most of the developing countries, Cleland showed that fertility has declined and still is declining, though important exceptions remain. Fertility transition is well advanced in Latin America, South and East Asia. Yet, there is no sign of any abatement in the decline, and even in China, where fertility was stable for much of the 1980s, there is evidence of a further recent fall in response to a tightening of birth control policies. However, the continuation of fertility reduction in Third World countries does not necessarily imply that replacement level fertility will be inevitable. Argentina, for instance, has had stable fertility rates around 2.6 for the past 30 years.[48]

Notestein himself recognized such fertility movements after the "end" of the transition already in 1950. Hence, he changed the focus of demographic transition from fertility decline to permanent control. According to him, what "*would characterize demographic transition is the awareness developed in societies of the possibility of controlling their population growth anytime through fertility reduction instead of mortality increase.*" [49] This seems to be the most important element to differentiate pre

[46] See Pauti (1992), p 978.

[47] See Sardon (1994), p 7.

[48] See Cleland (1994), p 230.

[49] See Notestein (1950), pp 137 and 339-40, emphasis added.

and post-transition societies. In the past, population growth was regulated by famine, disease and high mortality where in the modern times fertility came to be element of control. In Blake's words, "the most recent transition has a felicitous ending."[50]

1.2.3-The Explanatory Model

There has long been a debate about economic versus social and cultural factors in promoting fertility decline. The classical model focuses particular attention on economic factors as the explanatory variables. The main assumption is that fertility behaviour tends to respond to changes in the economic benefits and costs that childbearing entails resulting in a reduced parental demand for children. The classical formulation developed by Notestein (1945) emphasises the development of urban and industrial societies which undermined traditional values supporting high fertility. Falling death rates increased the size of the family to be supported and lowered the inducements to have many births. Thus, a fall in mortality should stimulate and, therefore, precede the drop in marital fertility. According to Davis, this was the major cause of destabilization and resulted in "household tension".[51] Thus, fertility decline is seen as a rational accommodation to changes in economic situation.

The discussion carried on in this review about the explanatory model starts with the role played by mortality. Preston (1978) considers four mechanisms that relate infant mortality to fertility: the child replacement, the insurance, the physiological and the societal effects.[52] The role played by these mechanisms in societies depends on the presence of a well defined notion of ideal family size and this means *conscious* choice. According to van de Walle (1986), fertility is not within the calculus of conscious choice in pre-transitional societies. Since couples do not look for a desired number of children, the concept of replacement when an elder child has died does not apply. Neither does the insurance effect which is the anticipation of the death of child as parents perceive that

[50] See Blake (1985), p 395.

[51] See Davis (1963), p 347.

[52] Quoted in van de Walle (1986), p 202.

infant mortality is higher. The physiological effect may play an important role in breastfeeding societies or in those where postpartum abstinence is longer than the period of lactation. The last mechanism, the societal effect, is related to the norms and customs of the community established to ensure the balance between fertility and mortality.

Empirical evidence from the European Project summarized by Knodel and van de Walle (1979) indicates that European fertility declined under a wide variety of infant mortality conditions. Van de Walle (1986) showed that in some provinces of Germany, fertility declined when infant mortality was about 300 per thousand. In England and Belgium, for example, the decline of fertility preceded the decline of infant mortality. In Switerzland, infant mortality started to fall in 1883 and fertility in 1889. In Sweden, the onset of decline in infant mortality preceded the decline in marital fertility by 100 years. Moreover, mortality in Europe was still high when the fertility transition started with infant mortality rates well above 100 per thousand in most countries. According to Cleland, this evidence does not support the effect of child survival on the European fertility decline.[53]

On the other hand, Chesnais (1992) and Cleland (1994) agree that in Third World countries mortality decline preceded fertility decline. This was also confirmed by Zavala (1990) for Latin America. However, Casterline (1993) and Guzman (1993) showed that the relationship between mortality and fertility is highly variable even in developing countries. They found a wide span in infant mortality at the onset of fertility transition in both Asia and Latin America. In Asia, infant mortality ranged from 80 to 145 per thousand and in Latin America from 62 to 151 per thousand. There is similar variability in the time lag between the onset of mortality and fertility decline.[54]

Some scholars, such as Coale (1973) and Chesnais (1992) regard this lack of strong correlation between fertility and mortality as examples of "false exceptions". For others this lack of evidence suggests the possibility of a relationship between these two variables in the opposite causal direction. Woods (1988, 1989) found evidence that in

[53] See Cleland (1994), p 234.

[54] Quoted by Cleland (1994), p 234.

England the decline in fertility led to a decline in infant mortality. The fall in fertility could relieve mothers of caring large numbers of children and in the extent to which birth intervals become longer, mothers could give adequate care to children. This link is stressed by the long term improvements in levels of women's education. Increasing education can raise the likelihood of contraceptive prevalence and the way in which mothers cared for their babies. They may even encourage women to breastfeed. Van de Walle (1986) states that as infant mortality decline progresses and family limitation becomes widespread, one would expect couples to adjust their fertility to the levels at which infant mortality prevails. This would lead to a positive relationship between infant mortality and marital fertility. When infant mortality reaches low levels its effect on desired family size should disappear. This means that infant mortality and fertility are correlated only in the second stage of fertility transition.

A possible way of re-assessing the effect of mortality on fertility decline, suggested by Mathhiesen and Mc Cann (1978), is to consider the relationship between childhood mortality and marital fertility instead of infant mortality. They took into account the fact that the decline of European childhood mortality started before that in infant mortality. If parents are trying to adjust the size of families to some desired number of children, they are more interested in surviving children than in births. Knodel (1986) showed that in German villages couples who did not experience child mortality were most likely to adopt family limitation and to reduce their fertility. This relationship was true for couples married after 1825.[55]

Summarizing, there seems to be no inviolate rule that substantial mortality decline must precede fertility decline. Although in Third World countries, large declines in mortality are associated, after a lag, with fertility declines, there is considerable variation in mortality-fertility links. This leads to an important methodological problem already raised by Patarra (1973) and Szreter (1993) about the abandonment by the new versions of the more rigorous unidirectional specification of causal relationships posited in the classic version of demographic transition theory. In doing so, the model's conceptual

[55] See Knodel (1986), pp 382-4.

structure was allowed to became an empirically *irrefutable* theory. As a result, unambiguous propositions regarding the specific causes of change could no longer be constructed for empirical testing because all forms of causal relationship were allowed by theory as potentially possible.[56]

The second crucial and controversial issue of demographic transition theory as explanatory framework concerns the role played by economic development in fertility trends. The creators of the classical view argued basically in macro-economic terms. Their general theme is that modernization of society reduces many functions of family in production, consumption, education and recreation resulting in a new ideal family size. The empirical evidence shows that fertility declined in Western European countries and in the Third World under a variety of economic conditions. For instance, in France at the time of the first decline, this population was almost entirely rural, largely illiterate and far from prosperous. Parts of Hungary appear to share with France an early rural transition. Awareness of this movement supported the change in Notestein's view about the role played by modernisation in demographic transition. As previously discussed, the theory has been also used for policy reasons and the position of the two variables in the model was changed.

Cleland and Wilson (1987) and Knodel and van de Walle (1979), analysing the fertility decline in the Third World countries, concluded that there was no necessary connection between economic development and fertility decline. Nevertheless, Chesnais concludes that "fertility transition had scarcely penetrated into poorer areas" except in some Latin American countries where the influence of European population was stronger such as in Chile, Argentina, Uruguay and Cuba. Apart from that, all other countries which have experienced some fertility decline exhibited some indicators of modernity such as lower infant mortality, education and urbanization higher than the regional average at the onset of fertility transition. He emphasises the experiences of Sri-Lanka, Taiwan, South Korea and Puerto Rico.[57] Hence, an important point to be raised here is about the

[56] See Szreter (1993), p 683.

[57] See Chesnais (1992), p 379.

imprecision of the concept of development that is always confused with modernization. Development has a broader meaning, embracing the most varied aspects of health, economic, social, educational, cultural and political transformation.

This notion that modernization changes the economics of childbearing, resulting in it becoming economically disadvantageous, has stimulated the advent of economic theories of fertility at the individual level as well. They were developed as a branch of the theory of consumer choice and assume that people are utility maximizers. They consider pre-transition fertility as rational as transitional fertility. The central theme stated by the Chicago school is that the reduced demand for children determined by income, prices and tastes is the most important determinant of fertility decline.[58] Reproductive decisions are assumed to be made by economically rational actors motivated by desires and preferences and by rationally choosing among means that will produce the highest satisfaction or utility. Little attention was given to social or cultural factors except education.

This approach has received much criticism for its mechanistic view.[59] The widely accepted criticism is that one raised by Cleland and Wilson. They believe that there was not a *conscious* exercise of fertility control within marriage in pre-transition times which does not necessarily imply large families by choice. The absence of control does not imply that children possess a high economic value for their parents, nor do fertility variations in pre-transition societies appear to relate to concomitant variations in the economic role of children. Cleland and Wilson's analysis of European and Third World experiences emphasises the role of cultural affiliation and parents' education on the onset of fertility transition.[60]

The effect of education on fertility in developing countries is strongly confirmed at both familial and national levels. It has two main aspects; the level of education acquired by parents, particularly mothers, and the schooling opportunities for their

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[58] See Becker (1981), Schultz (ed) (1974) among others.

[59] See, for instance Blake (1968), Hirschman (1994), Miró and Mumert (1982), Robinson (1992) and Pollak and Watkins (1993).

[60] See Cleland and Wilson (1987), p 27.

children which can increase costs of children and reduce benefits. However, it is important to note that more education can also result in fertility increases. Improved health conditions through the diffusion of knowledge about personal hygiene, food care and environmental dangers tends to enhance the potential supply of children by raising fertility. More education reduces infant and child mortality leading to a higher number of surviving children.

Another attempt to reformulate the classic explanatory view of fertility as well as the economic theory of fertility was carried out in Latin America by PROREPO, Process of Population and Reproduction.[61] The name, in itself, was meant to characterize a new posture towards the study of fertility. The starting point was a strong criticism of the a-historicism of previous approaches, especially the idea of the suitability of large family size to the traditional part of societies and small family size to the modern part. Contrary evidence to this view was taken from the large Latin America cities where the informal sector has played as important role in absorbing the young labour force as in rural areas.[62] Hence, large families in urban areas are considered to be just as rational as in rural areas. This reformulation had a Marxist inspiration and saw fertility as a quantitative expression of production and reproduction. Within it, reproduction had a variety of meanings, reproduction of labour force, reproduction of production relations, reproduction of social classes and reproduction inside social classes. In addition, reproduction did not refer only to the biological capacity of bearing new generations but also included mortality differentials and migratory movements. The most important point was the concern with fertility as a part of social behaviour inserted in a specific society with all peculiarities and meanings.[63]

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[61] This was a working group created in 1972, inside the Commission on Population and Development (CLACSO).

[62] See for instance Patarra and Oliveira (1974); Aldunate (1975) and Torrado (1976).

[63] This approach resulted in a large number of studies about Latin America fertility. Most of them and a detailed description of this approach are published by CLACSO in a serie called: <u>Reproduction de la Poblacion y Desarrollo</u>. A good summary is found in Benitez (1993).

Within the perspective of the demand for children, Easterlin (1983) offered a framework for understanding the fertility decline combining economic and sociological theories. His framework sees the effect of modernization on fertility through the intervening factors of supply, demand and costs of regulation of births. The classic socio-economic determinants were considered as affecting demand and the cultural variables that constrain natural fertility as influencing supply as well as mortality and nuptiality. One important result of this approach is to show how modernization may first raise fertility prior to the fall. Although this model presents much more flexibility than the strict micro-economic approaches, the idea of costs and benefits remains central and in this regard its broader socio-economic approach is not much different from the micro-economic models.

The best known attempt to combine economic, sociological and institutional issues is produced by Caldwell (1976). He disagreed with the classical theory that pre-transition fertility behaviour was irrational. It was rational but within a framework established by social ends which differ from society to society. Pre-transitional societies are characterized by a net flow of goods from children to older generations. A reversal of the direction of this flow is the driving force behind fertility decline. The primary force of change appears to be Westernization which he conceptualizes differently from modernization. According to him, Westernization is a borrowing process while the second one is structural. Westernization brings about the predominance of the nuclear family. Hence, the locus of reproductive decision making is centred on couples who become free to concentrate their emotion and expenditures on their children. As such care is expensive, family size falls. This may explain the reduction of fertility in areas at very low levels of modernization such as Sub-Saharan Africa.

The role of culture in the arguments of the classical demographic transition theory appeared in Notestein's more recent work (1983) but it was considered "subsidiary" by Hayes. According to Notestein, *"the difference in the responsiveness of death and birth to the events of modern era in turn has its source in universal differences in the ways in* *which the normative orders of all societies impinge on human fertility and mortality"*.[64] This role was elaborated further by Lesthaghe who assumed that these are the main determinants of fertility behaviour. For cultural and ideational values he considers religious belief and practice, secularization, materialism and individualism. These promote free choice and "self fulfilment". He introduces the notion of "higher order needs" in an affluent society leading to very different needs to be met, especially psychological non-material needs. He sees fertility decline as an essential part of a broader emancipation process.[65] Further explanations including the impact of language, secularization, the creation of modern states, equality among citizens were developed by Cleland and Wilson (1987) and Le Bras (1989), among others. Cleland and Wilson analyzed the Western European and Third World experiences and pointed out that "at societal levels, the timing of transition is strongly affected by cultural boundaries and is associated rather with indicators of social development, such as literacy, than with economic indicators".[66] By culture, they mean language, religion, customs or values. This view is criticised by Alter for the lack of characterization of the cultural differences between linguistic regions. According to him, there is no clear explanation of "what is about linguistic regions that determines the timing of fertility decline".[67]

The last fertility determinant analyzed here is *diffusion*. This has been considered by Bixby and Casterline the third causal agent of fertility transition above and beyond demand and supply factors.[68] Although it has not been explicitly included in the classic view of theory of demographic transition, the possibility that information flows and that the diffusion of ideas plays a significant role in fertility transition was already mentioned in the earliest studies. For instance, Thompson (1930) explained the relatively low fertility

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[64] Quoted by Hayes (1994), p 2.

[65] See: Lesthaghe (1983), p. 411.

[66] See: Cleland and Wilson, p 27.

[67] See Alter (1992), p 21.

[68] See Bixby and Casterline (1992), p 147.

of clerical workers in terms of some proximity to their bosses.[69] Notestein believed in the spread of birth control despite the absence of fundamental changes in the social setting.[70]

A more elaborate version of the role of *diffusion* in fertility transition was provided by Carlsson. This was explained by an innovation followed by diffusion and not merely by an adjustment to new economic conditions. Fertility decline starts in a setting where there was no, or at most very limited, practice of birth control and spreads to all segments. "*Birth control is contagious*" and is as much a group decision as an individual decision. Another important element raised by him is the assumption of lags and a "trickle down" in the spread of skills and attitudes regarding fertility control.[71] A widening of socio-economic fertility differentials early in the process of decline and a convergence of fertility levels later on is considered by Haines to be the mechanism through which diffusion works. According to him, this seems to be the case in Japan in the twentieth century and in the Unites States in the late nineteenth century. For England, he found that social-class differentials did widen during the early stages of fertility decline, late nineteenth century. It is likely that the decline occurred earlier amongst middle and upper classes. Social and economic elites apparently exercised their roles as leaders in modifying human reproduction.[72]

Cleland and Wilson state that modern world fertility decline is more closely associated with the *diffusion* of an idea than with micro-economic forces.[73] Bixby and Casterline conceptualized the diffusion effects of fertility transition as distinct from the effects of social and economic variables but not opposite to them. "Rather, diffusion processes reinforce the effects of social and economic variables". They make an analogy

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[69] Quoted by Bixby and Casterline (1992), p 147.

[70] Quoted by Szreter (1993), p 673.

[71] See Carlsson (1966), p 165, emphasis added.

[72] See Haines (1989), p 308 and p 321.

[73] See Cleland and Wilson, p 29.

between fertility diffusion and epidemiological studies where the spread of diseases is made by person-to-person contact rather than by exposure to fixed hazards.[74]

The importance of diffusion as a determinant of fertility decline gained strength with the evidence brought by the European Fertility Project of the great decline in European marital fertility that took place from 1880 to 1930. The decline started first in urban provinces but rural provinces followed quite quickly. About 59% of the 700 provinces experienced fertility decline between 1890-1920 and 71% between 1880-1930. These provinces were characterized by a great diversity of economic circumstances in terms of levels and trends of economic development at the time of the onset of the fertility decline. They ranged from rural societies dominated by subsistence agriculture to urban and industrial areas. Moreover, this decline was widespread in many areas of European overseas settlement, mainly in the English speaking areas.[75] Evidence for Third World countries also indicates a rapid and widespread fertility decline taking place there since the 1960s. According to Bravo, in Latin America, as soon as the fertility decline starts at national level it quickly spreads to all social groups, all residence areas, etc.[76]

The large fertility decline in developing countries might be associated with factors such as family planning programs, increased education, advances in media, especially radio and television, that might have acted as a channel of diffusion. Family planning programs may be seen as a channel of diffusion as well a means for achieving the objective. The correlation between program effort and rates of fertility decline is not clear. Bongaarts estimated that programs have been responsible for about 43% of the fertility decline in the developing world between 1960-65 and 1985-90.[77] However, Pritchett, based on a detailed review of available data on the role of family planning program in fertility decline, concluded that to achieve low fertility "it is fertility desires and not

[74] See Bixby and Casterline (1993), pp 148-9.

[75] See Watkins (1986), pp 432-3.

[76] See Bravo, (1991), p 10.

[77] See, Bongaarts (1995), p 26. Another analysis may be sees in Mauldin and Ross (1994).

contraceptive access that matter".[78] This suggests that family programs only facilitated the achievement of established preferences. Another important element of diffusion is increased education which can also result in changed perceptions of family size. According to Cleland and Wilson, "the fact that, in most countries, a few years of schooling appears sufficient for a shift in reproductive behaviour is more likely to reflect changing perceptions, ideas and aspirations than changes in objective micro-economic realities".[79]

A lot of attention has recently been put on the impact of the mass media, especially television, on fertility decline in Third World countries. DHS surveys have provided empirical evidence for that. They show that women who watch television are more prone to adopt fertility control than those who do not.[80] Empirical analysis carried out by Faria (1988) points to an association between the expansion of the number of televisions and the fertility reduction observed in the Brazilian Northeastern region from 1960 to 1980. He explains, that although Brazilian television does not have implicit or explicit messages aimed at promoting changes in reproductive behaviour, television is the most universally-diffused manner of relating to the outside world, leading people beyond the narrow limits of family, community and workplace. An important Brazilian television genre has been the *telenovela*. The content of the messages about fertility behaviour conveyed by it was analyzed by Faria and Potter. They argue that they disseminate a particular family image: small, unstable and consumer-oriented. Moreover, they also stress the advantages for women of separating sexuality from reproduction, of remaining single and working outside the home[81].

It is likely that television (or the media in general) affects fertility regulation through changes in people's conceptions of social roles, such as traditional male authority,

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[78] See Prichett (1994), p 39.

[79] See Cleland and Wilson (1987), p 22.

[80] See for instance: Faria (1988), Faria and Potter (1994); Wong (1994) and Westoff (1994).

[81] See Faria and Potter (1994), pp 28-9.

definition of sexual conduct and family size. However, there is no evidence that television in itself created the value of small family size or any other value. It spreads established and socially accepted ideas. For instance, in the 1950s the most famous Brazilian soap opera broadcast by radio was called The Right to Be Born. This was so successful that it was broadcast by television in the early 1960s. Hence, what can be expected from the impact of mass media, or even from other diffusion channels, on fertility decline is only its acceleration via the diffusion of the value of small family size and of birth control methods. The legitimisation of this value must be first of all socially accepted in order to be diffused.

The expansion of health services in general is also regarded as an element of diffusion, apart from its direct impact of family planning services. It has been pointed out by Loyola and Quinteiro (1982), Faria (1988) and Bixby (1994) that women's exposure to the medical subculture increases the regulation of their social behaviour by medical authority. This creates opportunities for their interaction with health professionals and replaces marital and religious authority in matters of reproduction. One important consequence is the facilitation of women's incorporation of values such as the belief in the possibility of interfering in biological processes, the advantages of taking care of their bodies and the efficacy of medical, surgical and pharmaceutical intervention. Bixby found that the adoption of modern contraceptive practices in Costa Rica was influenced by women's interaction with medical personnel.[82] Again, it should be seen as an agent of the diffusion of established ideas. It may also diffuse favourable ideas about birth control or against it. For instance, in the past the British Medical association used to consider contraception unnatural and warned about all sorts of diseases that would occur with their users. Birth control was associated with premarital intercourse.

Summarizing, the discussion of the role of *diffusion* in fertility decline is lacking in conceptual clarity. It does not seem easy to test it empirically as the theory does not present a definition of variables and consequently there are few studies which clearly specify this role. According to Bravo, most of the empirical evidence is based on statistical

[82] See Bixby (1994), pp 18-21.

residuals. When the socio-economic variables do not explain a large proportion of the variance, it is suggested that diffusion might be important. Nevertheless, the residuals may be composed of variables not considered by the model and also by errors in its formulation.[83] A further point raised in this review is that the approach refers to the way changes in ideas are spread without any concern for the process through which ideational change takes place. Moreover, the spread of values cannot be the only factor responsible for human behaviour. Finally, why some human behaviours spread and other do not is unclear.

This review shows that apart from education is difficult to find a common group of determinants of fertility decline. The lack of empirical evidence supporting the classical view of the explanatory model of fertility transition has resulted in many amendments to it and even change in the order of the relationship between the proposed dependent and independent variables. According to Szreter, the "modernised" versions of demographic transition theory are conceptually indeterminate and cannot generate unambiguous testable hypotheses regarding the specific causes of fertility change. It continues to be the centre of demography because it still provides a ready-made rationale for policy activism and a convenient tool for forecasting population growth under assumptions of policy effectiveness.[84] However, by becoming a policy instrument, the theory loses its explanatory and predictive power transforming itself into a historical synthesis of Western European and ex-colonies experiences.

1.2.4- The Predictor Model: the hypothesis of convergence

The last element of demographic transition theory analyzed here is its capability of foreseeing future fertility trends, especially in Third World countries. Kirk in 1944 predicted that fertility transition would become universal. For him, this means stability in population trends that would be achieved as happened in the past. "They are the more certain elements in a most uncertain world". He considered the different countries in the

[83] See Bravo (1991), p 3.

[84] See: Szreter, P 686.

world on a single continuum of demographic and economic development having both spatial and temporal significance.[85] This point of view was not shared by Chesnais who stated that the inability of theory of demographic transition in predicting the timing or specific pattern of future development in any particular country is its main weakness.[86] In the descriptive model of demographic transition theory it is very clear that the future means sustainable fertility reduction and stability. Nevertheless, how fertility rates would stabilize is not stated. This idea of stability implicitly brings the idea of homogeneous fertility levels among all countries and the disappearance of internal differences in the third phase of demographic transition.

The empirical evidence shows that fertility transition is underway in most continents. Although Sub-Saharan African countries have been more resistant to change, among the 11 countries of the region covered by the DHS survey until 1986 only Uganda did not report some change in fertility.[87] The transition is happening even at low levels of socio-economic development; Bangladesh is a good example of that. The World Fertility Survey indicated that in 1965-70 the range of variation in total fertility rates among the major continental regions surveyed was not very large, from 5.0 children in the Caribbean to 6.9 in Eastern and Western Africa. DHS results for 1980-85 showed a dramatic decline in fertility and a wider range of variation from 2.3 in Eastern Asia to 6.9 in Eastern and Western Africa. The largest decline took place in Eastern Asia; the TFR dropped from 5.4 to 2.3.[88] Most European countries and some non-European ones such as Japan, Hong Kong, South Korea, Singapore and Taiwan are experiencing fertility well below replacement. Nevertheless, Freedman and Blanc pointed out that the movement of Third World countries towards replacement levels did slowdown in some regions of the world such as Southern Asia, the Caribbean, Central America during 1980-85.[89]

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[85] See Kirk (1944), pp 28-9.

[86] See Chesnais (1992), p 5.

[87] See Fredman and Blanc (1991), p 16.

[88] See Fredman and Blanc (1991), p 6.

[89] See Freedman and Blanc, pp 8-9.

The empirical evidence does not seem enough to support a stabilization of fertility rates at a predetermined and universal level, for instance at the replacement level. As previously discussed, there was no stability in the past and neither was it the case that once fertility started to decline its continuity would be inevitable. It is clear that there is a universal movement towards small family size at aggregate and individual levels but the homogenization of fertility rates is improbable. There is not even any empirical evidence of homogenization in the mean desired number of children. Blake (1970) gathered information about the ideal number of children among white American women through 13 surveys carried out between 1936 and 1961. The great majority of answers were concentrated in a range of two to four children in all surveys. The modal value fluctuated in all surveys without indicating a reduction in the proportion of women who reported preference for four children. The preference for zero children was not statistically significant. This points to a significance of the procreative role among American women.[90]

Data gathered by the World Fertility Survey during the second half of the 1970s and by DHS during the second half of the 1980s for 15 Third World countries point to a large range of variation in the average number of desired children among ever married women. During the late 1970s this mean ranged from 8.3 in Senegal to 3.7 in Thailand. Ten years later, the desired number of children was smaller 7.1 and 2.8 in Senegal and Thailand, respectively. However, the differentials were still quite marked.[91] These data confirm that, although there is a preference for a smaller family, there is no homogeneity in the ideal number of children. The differentials in fertility outcome within countries, regional and socio-economic, have also not been eliminated with the fertility decline.

Political efforts to bring fertility down as well as other pro-natalist policies are being adopted with positive results. This contradicts Coale's first condition for fertility transition which emphasises the progress from institutional control to *couples' choice* as an important difference between pre-transition and transitional societies. As individual

[90] Example extracted from Souza (1990), p 41.

[91] See Westoff (1991).

behaviour is grounded in culture and is a by-product of social norms, the recent fertility transition in developing countries suggests that social pressure through institutions may affect people's ideas towards family size. If modernization is being imposed on the developing countries and fertility control is being considered an important element in bringing about modernization, thus, the question addressed here: does demographic transition theory predict a reduction in family size or does it impose it?

1.3-OBJECT OF STUDY

The object of study is the underlying theoretical and empirical issues of demographic transition theory: its role as an analytical framework for understanding fertility trends in different socio-economic situations. This objective is addressed thorough a comparative analysis of fertility movements in three different socio-economic Brazilian regions during the twentieth century. It seeks to identify a common pattern in trends and determinants among the three areas focusing on the timing, pace and determinants of fertility movements and their consequences in terms of family composition.

The selected regions present quite marked differences in socio-economic conditions and demographic trends. They are: the Northeast, the poorest region of the country, composed of nine states; the state of Rio de Janeiro and the state of Sao Paulo. The later two states are both located in the Southeast region, the richest region of the country but they have also presented clear socio-economic differences over this century. Altogether these three regions account for 69.5% of the Brazilian population in 1991 and 60.5% of the Gross National Product which should make the conclusions reasonably representative for Brazil as a whole. A detailed description of the socio-economic characteristics of the three areas will be given in Chapter 2, section 6.

As will be seen in the next section, most studies of Brazilian fertility transition are national studies. However it is difficult to think that demographic changes happen in a single way in a country with such marked diversities as Brazil. Its history has not happened in this way. Hence, it is expected that the study of areas that present marked socio-economic differences will allow a deeper understanding of fertility movements without missing the reference to the whole society.

1.3.1 The Questions

The questions addressed are:

1-Is there a **descriptive** model of fertility transition?

1.1-What are the similarities and differences in regional fertility trends and in family formation patterns?

1.2-Do these findings provide support for the making of generalizations and for accepting demographic transition theory as a **descriptive model** of long term fertility trends?

2-Are there common determinants of regional fertility change? If so, are these common features sufficient to make generalizations about the **explanatory** power of fertility transition theory?

2.1-Do fertility differentials by socio-economic characteristics vary by region?

2.2-Does the relationship between reproductive behaviour and socio-economic variables depend on the stage of fertility transition?

3-Do the analyzed trends provide elements which allow the **prediction** of convergence in Brazilian reproductive behaviour?

3.1-If so, what are the convergent fertility rates?

3.2-Which variables drive fertility to convergence?

1.3.2 The Theoretical Framework

As previously discussed, fertility transition has been defined by the literature as modification of the reproductive behaviour according to the previous number of children. This occurs, according to Coale (1986), because families have reached the number of children that they do not want to exceed. His first precondition for sustained decline in marital fertility centres on the premise that "reproductive decisions must be within the calculus of *conscious choice*".[92] Van de Walle suggested that without the perception of a *numeracy* about children, the perception of a particular family size as a goal in a long term strategy of couples, it is unlikely that *conscious choice* exists.[93] This definition of fertility transition clearly explains the start of fertility transition through the *stopping* of reproduction and assumes an awareness of desired family size. The timing in life cycle which occurs is determined by the ideal parity. The role played by the two other phases of the process of family formation, the *onset* and the *spacing* have been giving little attention.

It is assumed in this thesis that fertility transition means deeper changes in reproductive patterns than simple fertility reduction. Hence, it is suggested here that fertility transition may occur in two stages. It starts when families perceive the necessity to *control* their size after reaching a certain parity. This may be the desired parity or one higher than that. This is translated, with some lag, into birth control and eventually into fertility reduction. The idea of smaller family size already translated into lower fertility is more widespread. When new families are formed they already had the preference for smaller size and start to work towards this target, *to plan* their families, at an early stage in their reproductive life. It can mean later marriage, motherhood postponement or early contraception. Deliberate birth *spacing* becomes important as well. Thus, fertility experiences a newer and more accentuated decline.

An unclear point is to what degree the new behaviour reflects *couples' conscious choice* or is a result of institutional pressure. *Conscious choice* should reflect genuine preference. There are some indications in developing countries, for instance, the narrowing of the range of preferable or observed family size, that social pressure may come before conscious choice. Social pressure through institutions as the media may affect people's ideas about desired family size. They spread new values which in some way reflects the necessity of a specific social group. They offer services such as health, for instance, which may also act as an element of moulding behaviour. This may lead to a

[92] See Coale (1986), p 65.

[93] See: van de Walle (1992), p 490.

convergence of family preferences. It is assumed that institutions affect partially fertility preferences. *Conscious choice* play some role in the definition of preferences.

It is also assumed that there are a large variety of factors that direct or indirectly affect reproduction apart from couples preferences. Some of them are even unpredictable. Bongaarts in a simulation based on data for the United States concluded that only 6.2% of the couples have a high probability of achieving the desired mean family size. The other 93.8% will experience at least one non-planned event such as contraception failure, sterility, fetal wastage, longer conception waiting time, an undesired sex mix of children, divorce, widowhood or the death of one of the children. Concluding, "to reach desired family composition is not simple, the great majority of couples will have to modify their desired family size".[94] Thus, fertility rates are not expected to converge on the same point. Fertility differentials will change as fertility decline advances but they will not be eliminated.

Finally, it is not believed that fertility transition may be described only by three or even four phases. Transition means movement and human behaviour is always in movement. The concept of fertility transition accepted here is that proposed by Notestein which characterize demographic transition by the awareness developed in societies of the possibility of controlling their population growth anytime through fertility reduction instead of mortality increase.. [95] Hence, fertility transition is in general associated with fertility decline but not with irreversible decline which would lead to a stabilization of fertility rates.

1.3.3 The Hypotheses

1-The range of family size, preferred and observed, in the three studied areas has been narrowing as a consequence of social pressure.

2- There is a gap in the translation of preferences into behaviour which results in a wider range of observed fertility than of desired fertility. It also results in a great

[94] See: Bongaarts (1984), p 18.

[95] See Notestein (1950), pp 137 and 339-40,

amount of unwanted fertility that is larger the earlier is the process of fertility transition.

3-Fertility decline is a result not only of contraception for *stopping* reproduction but of strategies for contraception. Early parity at start of contraception and other strategies of *spacing* as well as later onset of reproduction increase the chance of a woman reaching her desired family size and brings about more fertility reduction.

4-Socio-economic variables such as residence, ethnicity, income and education play some role in fertility preferences and behaviour towards these preferences. However, this role is regionally differentiated.

5-Exposure to health services, mass communication and low religiosity are important variables in diffusing the value of small family, accelerating the fertility decline and contributing to the reduction of the fertility differentials by socio-economic variables. However, it is not expected that fertility rates would converge within each region.

6- The variables mentioned above also play some role in regional fertility differentials, preferences and outcomes. However, there is a component of the differentials that is not explained by them. Thus, there is no convergence of regional fertility rates.

1.4- WHAT IS KNOWN ABOUT BRAZILIAN FERTILITY TRENDS AND DETERMINANTS?

A large number of studies have estimated Brazilian fertility trends and addressed their determinants with some detail using a variety of approaches. Their concern has been mostly with fertility decline. Only three papers that attempt to explain the persistence of high fertility in pre-transition times are known.[96] The review on the determinants of the Brazilian fertility decline is extensively based on Martine (1995). He classified these determinants into four broad categories: the demographic or proximate determinants, the

[96] See Paiva (1984) for Brazil as a whole and Almeida (1977) and Moreira and Moreira (1982) for the Northeast.

impact of modernization, the effect of economic pressure and the unexpected outcomes of institutional changes and public policies. Most studies have tried to explain fertility decline in Brazil as a whole. At the regional level, the Northeast region and the state of São Paulo are the areas which have had the largest number of studies but without any comparative concern between the two areas.[97] A large number of studies at local level was produced based on the National Investigation of Human Reproduction (NIHR) undertaken between 1975 and 1977. They will not be reviewed in this section but some of their results will be discussed throughout the thesis, especially in Chapter 4.

1.4.1-Fertility Trends

Brazilian fertility movements have been measured in a large number of studies at national and regional levels.[98] The first fertility questions were introduced in the 1940 Census. Thus, little is known about fertility trends in Brazil before the 1930s and 1940 became a landmark in the history of demographic studies. Fertility was considered practically constant by most demographers until the mid 1960s. The Brazilian total fertility rate dropped from 6.2 in the 1930s to 5.8 in the 1960s.[99] Since then, according to Fernandez and Carvalho, the TFR declined by 8% between 1965-70, 25% between 1970-75, it remained stable between 1975-80 and experienced a decline of 20% between 1980-85.[100]

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[97] See, for instance, Moreira and Moreira (1982); Berquó et al (1985), Faria (1988), Moreira (1993), Faria and Potter (1994), Campanário and Yazaki (1994a, 1994b), Camarano (1994) and Wong (1994), among others.

[98] See, for instance, Berquó (1973, 1977), Bulhões de Carvalho (1928), Camarano et al (1989), Camarano and Beltrão (1990), Martine et al (1990), Carvalho (1973), Carvalho and Menezes (1986), Carvalho and Paiva (1976), Fernandez and Carvalho (1986), Frias and Oliveira (1991), Frias and Carvalho (1994), Irwin and Spiegel (1976), Leite (1981), Merrick and Berquó (1983), Mortara (1940, 1954, 1967), Oliveira and Silva (1986), Wood and Carvalho (1988).

[99] Salgado Mendes (1985) and Oliveira and Silva estimates (1986) quoted by Carvalho and Wong (1990), p 20.

[100] These are the only known estimates of TFR by quinquennia. They use the own child method. See Fernandez and Carvalho (1986), p 83.

Carvalho and Wong showed that even in the Southeast region, the most urbanized and modern region of the country, fertility declined only slightly until the mid 1960s. The TFR fell from 5.7 to 5.3 from 1935-40 to 1965-70.[101] Recent fertility estimates for Brazil as a whole and the five major regions point to fertility decline in the Southeast Region during the 1930s. Its TFR fell from 6.0 in 1933 to 5.1 in 1943. During the next four quinquennia, this rate was stable. Fertility decline resumed over 1963-1968 and the TFR reached 4.0 in 1970-1975. They also point to a slightly declining TFR for Brazil as whole during 1933-58, from 6.2 to 5.9.[102]

It is recognized that the fertility decline spread to all regions and social groups during the 1970s intensifying during the 1980s. However, there are still significant differences between fertility rates by region and social class. In 1980-84, the TFR in the urban area of the Southeast region was 2.7 and in the rural Northeast Region it was 6.5.[103] Differences by income groups are also large. Poor women had on average 3.2 children more than rich women in 1975-80 who already presented a low value for their TFR, 2.9.[104]

1.4.2 The Proximate Determinants

The first approach considered here looks at the proximate determinants of fertility decline.[105] All studies agree that the primary factor accounting for the fall in the TFR is the increased use of contraception. Pill and sterilization are the main methods chosen. Sterilization has substantially increased in all Brazilian regions. Changes in the

[101] Salgado Mendes (1985) and Oliveira and Silva estimates (1986) quoted by Carvalho and Wong (1990), p 20.

[102] See Frias and Carvalho (1994), p 25-6.

[103] See Oliveira and Silva (1986), p 215.

[104] Poor women are those belonging to a family with a monthly income less than a minimum wage. Rich women belonged to a family with a monthly income more than 10 times the minimum wage. See Wood and Carvalho, p 157.

[105] For this approach, see, for instance, Merrick and Berquó (1983), Berquó et al (1985), Wood and Carvalho (1988), Silva et al (1990), Rios Neto et al (1991), Moreira (1993) and Camarano (1994).

distribution of women by marital status and in the mean age at marriage were not marked in the period considered. Thus, they did not play an important role in the fertility decline. So did changes in breastfeeding patterns.[106] Duration of marriage seems to have played a significant role in the explanation of individual differences in fertility behaviour since it reflects the length of exposure to the risk of conception.[107]

1.4.3 The Impact of Modernization

The other category of studies which attempt to explains the Brazilian fertility decline analyzes the impact of modernization. Several scholars have confirmed the inverse relation between fertility and education and income. Merrick and Berquó (1983) pointed out that increased educational attainment and average earnings played an important role in the Brazilian fertility decline that took place between 1970 and 1976. Also, measuring the impact of education on fertility trends for Brazil as a whole, Lam et al did a fertility cohort analysis which found "dramatic evidence that the increase in schooling does in fact produce a substantial decline in cohort fertility". They claim to be able to explain from 50% to 90% of the fertility decline across recent cohorts by changes in the schooling of women and their husbands. Nevertheless, they recognize that the precise mechanism which would explain the relationship between schooling and fertility is not clear. Expectations about the links between schooling, fertility, wages and the opportunity cost of time are confirmed at high levels of education but not at low levels.[108]

Although Martine recognizes the importance of the relationship between schooling and fertility, he argues against this conclusion stressing the simultaneity of events experienced by the same cohort, the 1940 birth cohort. These women experienced the greatest improvement in education and reductions in fertility among all birth cohorts considered. All these changes took place in the post World War II period when many

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[106] See Silva et al (1990), p 45, for Brazil as a whole and Camarano (1994), p 41, for the Northeast fertility changes.

[107] See Silva et al (1990), p 16.

[108] See Lam et al (1993), pp 22-6.

other important changes were occurring in society such as technological and communication advances, urbanization and material development. All these added to education improvements should have changed people's ideas in many respects and particularly in relation to the value of small family size.[109]

Female labour force participation and the possession of a television were among the other factors cited by Merrick and Berquó as being related to the linkages between education and lower fertility.[110] Also, for Brazil as a whole, using the 1986 DHS, Silva et al identified two main socio-cultural factors through which modernization affects fertility; the wife's education and the wife's religiosity. Both indicate the importance of attitudinal change in the process of fertility transition. Nevertheless, a wife's education presented a complex causation flow reducing the length of breastfeeding, increasing the likelihood of child survival and contributing to marriage postponement.[111] Along similar lines, Alencar and Andrade looked at the relation of several socio-economic factors with sterilization and found that sterilization is positively related to social status as measured by husband and wife's education.[112] Nevertheless, using the same data set as the two previous studies (DHS 1986), Rios Neto et al came to a different conclusion. Women's education, women's participation in the formal sector of labour force, husband's education and household income were not important to explain contraceptive methods choice. A possible explanation is that these structural variables are important for determining the onset of the fertility decline but not for explaining its diffusion and later implications in terms of contraceptive choice.[113]

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[109] See Martine (1995), p 20.

[110] See Merrick and Berquó (1983), pp 127-43.

[111] See Silva et al (1990), pp 24-5.

[112] See Alencar and Andrade (1989), p 1055.

[113] See Rios Neto et al (1991), pp 128-9.

1.4..4 The Impact of Worsening Living Conditions

Another approach proposes that fertility reduction in Brazil may be attributed to generalised economic difficulties rather than, or in addition to, widespread social changes linked to modernization. Paiva (1984) suggested a connection of fertility decline to two factors. First, a widespread process of proletarization that was initiated in the post World War II period and accelerated during the period of intense economic growth in the early 1970s. Second, the generalization of monetization through a substitution of subsistence consumption for monetized goods. A combination of these factors with poverty increased uncertainty and the likelihood of internalizing the costs of fertility decisions to the family decision making process.

The proletarization hypothesis was tested by Rios Neto for Brazilian rural settings using micro-level data from the 1980 Census. This was only partially supported. A husband's occupation led to fertility decline only in the case of permanent wage labourers while casual wage labourers still had higher fertility. A wife's class position was a better determinant of fertility decline through the proletarization process while wives working as peasants had higher fertility than wives not participating in the labour force. The role of wives's education in the decline of rural fertility was puzzled with their occupational status. When the latter variable was controlled for in the regression, female education lost its negative and significant effect.[114]

Carvalho and Wong located the national fertility decline in two sub-periods both of which were marked by specific economic difficulties; the early 1970s and the early 1980s. In this view, the first decline, in 1970-75, is explained by a combination of structural change, proletarization of the rural labour force and rapid urbanization with circumstantial factors such as the deterioration of living conditions, increasing infant mortality in the large cities and a reduction in real minimum wages. During the second period of fertility decline, the early 1980s, Brazilian society was marked by a profound crisis which was not only economic but also political and institutional. They stated that the crisis brought about in families some sense of insecurity about their future. In this period

[114] See Rios Neto (1989), pp 15-7.

of deep recession, even the middle class had to consider the cost of children more closely.[115]

The connection of fertility decline with the deterioration of economic conditions has been contested by many authors. Lam et al, for instance, argued that this hypothesis must be reconciled with a very strong negative relationship between income and fertility in cross-sectional data for Brazilian households. The bivariate relationship between husband's income and the number of children ever born is strongly negative, although it becomes insignificant or slightly positive when the schooling of the wife and the husband are included in the regression.[116] A further problem with this interpretation is that it is hard to test at the micro-level with cross section data because it views fertility decline as a process and deals with complex and societal changes.

1.4.5 The Unexpected Consequences of Public Policies

As the Brazilian Government has never had an explicit family planning policy, another line of interpretation addressed by Faria (1988) looks for the unexpected consequences of policies established in other domains for fertility behaviour. This analyzes the effect of some policies which produced some unanticipated and unintended effects on fertility decline. Four policies are considered important: credit for consumption, the expansion of social security coverage, mass communications and health services. The role of the state is complementary to the structural process of modernization. The impact of these policies on fertility is given by specific interactions between them and the population. In spite of the relative income concentration, the credit policy contributed to the widespread use of durable consumption goods even among the poor. The generalization of consumption came at the expense of the satisfaction of some basic needs and led to an increase in family labour force participation. State investments in telecommunication, radio and TV reached practically all parts of Brazil, spreading a secular and westernized way of life. Governmental social security policy during this

[115] See Carvalho and Wong (1990), p 17.

[116] See Lam et al (1993), p 10.

period was marked by a generalization of coverage, though this was unequal between rural and urban areas and between the Northeast and the Southeast regions. Finally, Brazilian health policy did not have a deliberate family planning purpose but the expansion in its coverage allowed an increased interaction between the population and the medical culture. It is assumed that the increase in this interaction contributed to the generalization of a fertility regulation ideal, weakening the role of traditional authorities, reducing the psychic costs of fertility regulation and legitimating the use of contraceptive means.

A macro level test of this hypothesis was carried out by Faria through an analysis of the fertility decline occurred between 1960 and 1980 among 21 states based on censuses data. Variables such as employment in rural areas, urbanization rate and female labour force participation were important to the determination of differences in fertility rates. The factors related to government policies, especially health services, played a significant role in 1970-80 fertility decline.[117] A community level cross section test of this hypotheses was also performed by him, using the CPS (Contraceptive Prevalence Survey) data for 1980. The results refer to five Northeast states. A regression using factor analysis studied the community levels determinants of effective contraception use. A factor indicating the operation of convergent change factors positively affected the share of contraception use . Both private delivery and public medicine rather than social security also positively affected the dependent variable.[118] Two more empirical studies are available on the impact of television exposure to Northeast fertility decline.[119]

The last approach undoubtedly contains important elements for explaining the acceleration of Brazilian fertility decline started in the second half of the 1960s. The four policies combine elements of the modernization approach with the diffusion theory. Mass communication and health policies seem to be mechanisms that contributed to the widespread value of small families. Nevertheless, this falls short of clarifying the onset of

[117] See Faria (1988), pp 50-63.

[118] See Faria (1988), pp 75-80.

[119] See Faria and Potter (1994) and Wong (1994).

fertility transition and its regional differences. First of all, as already outlined there is no consensus about the timing and the spatial location of this onset. The implementation of the four polices mentioned above started in the later 1960s in the Southeast. This is consistent with the assumption that fertility transition started there at that time. However, fertility was already declining in some Brazilian regions in the 1930s.[120] Secondly, the implementation of these policies has evolved differentially among the Brazilian regions. So has the fertility transition. How the regional differences in the implementation of these policies have contributed to the differences in fertility trends has not been specified.

Summarizing, excluding the approach of the proximate determinants, the other three failed to offer a comprehensive view of the Brazilian fertility transition. Nevertheless, all approaches mentioned here have received some empirical support. The main reason for the absence of a comprehensive view seems to be the difficulty of compatibility in timing and *locus* where the determinants (modernization, poverty, policies implementation) took place with the fertility outcome. First of all, it is not yet clear when fertility started to decline and where. This can be partially explained by the fact that most of the empirical analysis carried out considered Brazil as a whole, are cross-sectional analyses or covered a relatively short period. The second one is that fertility decline has persisted through quite different cycles of the Brazilian economy. It started where industrialization began, the Southeast, it was intensified when modernization policies were being implemented and the economy was experiencing high growth rates and it became widespread in the poorer areas of the country, including the Northeast, during the severe crisis of the 1980s. The process of modernization paralleled the impoverishment of some groups of the population during the phase of high economic growth while infant mortality declined and nutritional levels increased during the 1980-83 economic crisis. This makes most of the cross-sectional analysis, based upon any approach, irrefutable especially if they focus on very aggregate levels. A further reason that might explain the incomplete understanding of the Brazilian fertility transition is the lack of a general and appropriate theoretical framework for studying fertility change. This

[120] This will be seen in Chapter 3.

was the most striking aspect of the state of knowledge on fertility until 1980, according to Miró and Potter[121] and seems to hold true still.

1.5-DATA SOURCES AND VARIABLES

The effort to understand historical fertility trends in Brazil encounters the difficulty of scarcity, defectiveness and comparability of information. Vital registration has been incomplete and estimates of base populations have showed many errors. There is a wide range of variation in the completeness of registration of vital events among the Brazilian states. Pereira (1969) estimated that only 50.9% of the children ever born in 1960 were registered in that year. The extent of under-registration ranged in 1960 from 93.4% in the state of Amazonas to 3.4% in Rio de Janeiro.[122] This system has been improving substantially and has been considered to be accurate for urban areas and the whole states of Rio de Janeiro and São Paulo. However, in some areas, the Northeast for instance, vital registration is still incomplete. Thus, most of the analyses of Brazilian fertility and nuptiality trends are based on census data.

This thesis is based mainly on published data, the Brazilian Demographic Censuses from 1940-1980 and on survey data, that are the Demographic and Health Surveys (DHS) carried out in Brazil in 1986 and 1991. Other published data from the 1986 and 1991 General Household Survey (PNAD) and from the Contraceptive Prevalence Survey (CPS) are also utilized. The PNAD undertook a special survey in 1986 in order to study contraceptive histories.

1.5.1 Census Data

The first Brazilian Census was carried out in 1872. After this the national censuses were supposed to be decennial and undertaken in years finishing with a zero. However, the 1880, 1910 and 1930 Censuses were cancelled and that of 1990 postponed until 1991. Its results concerning fertility questions have not yet been published. Starting in 1940, the

[121] See Miró and Potter (1980), p 94.

[122] Quoted by Carvalho (1973), p 27.

Brazilian Census Bureau, IBGE, began to plan, carry out and publish population enumeration meeting international standards of design, collection and reporting. One exception was the 1960 Census. Due to political and administrative instability in the early 1960s, its complete publication was delayed seventeen years. Even so, this publication was less complete than the two previous ones.

The first fertility questions were introduced in the 1940 Census as well as the first question about rural-urban residence. Since then, these questions have enabled many studies and estimates of fertility trends. As discussed in the previous section, they refer to period total fertility rates, age-specific fertility rates for Brazil as a whole, regions, states and socio-economic groups. As the thesis' interest lays in having historical series for the three regions and socio-economic variables, new estimates are calculated here for the considered period searching for comparability and consistency. The definition of urban population is based on administrative status rather than a minimum population size.

A difficulty faced is the lack of information which would allow the measurement of complete fertility time-period series for all of the socio-economic variables. Cross-tabulations relating fertility data with them are irregularly published in demographic censuses. Moreover, most of these tabulations are not disaggregated by age-groups and do not allow the calculation of conventional fertility measures. Consequently, published estimates based on special tabulations are also made use of in this thesis. Varying criteria have been employed for the establishment of informant's ethnic group or socio-economic status in the various censuses which also make time-period comparisons difficult.

As regards nuptiality, the first information dates from the start of civil registration and the first census, 1872. However, the definition of marital status has changed over time causing problems in time period comparisons. Until 1960, Brazilian censuses were much more concerned in gathering information about the *de jure* marital status of the population. Informal separations were frequently classified as marriages. On the other hand, population engaged in consensual unions were classified as single. Although, religious marriages are not considered strictly legal, women in this kind of union were considered by the censuses as being married. Since the 1960 census people in consensual unions have been classified as married and details about kinds of union and separations have been gathered.

In this thesis, married women were grouped with the single ones who had children in order to measure the proportion effectively married and to reduce the impact of the underreporting of consensual unions on the number of women exposed to the risk of childbearing. Although this grouping results in a reduction of the impact of misreporting, the bias is not quite eliminated. One bias is still left: women who were in informal unions but who had no children; they were exposed. This omission could bias the calculation of marital fertility rates, especially for younger women in the direction of higher fertility. On balance, this bias was judged to be preferable to other more serious problems.

1.5.2 Survey Data

The survey data used in this thesis came from the Demographic and Health Surveys (DHS) undertaken in 1986 and 1991. The first DHS and the 1984 and 1986 PNAD (General Household Surveys) are the main sources of statistical data on birth histories and contraceptive use at the Brazilian national level. The 1991 DHS was carried out only in the Northeast. Before these some others surveys at the state or local level were undertaken. The decision to use DHS instead of PNAD is due to the fact that although the 1984 PNAD undertook a special survey in order to gather birth and nuptiality histories, questions about contraceptive use were not included. Contraceptive use questions were included in the questionnaire of the 1986 PNAD but nuptiality information was excluded.

The 1986 DHS sample was designed to be representative at the national level and for six regions, North and Central West, Northeast, Minas Gerais and Espirito Santo, Rio de Janeiro, São Paulo and South, and the rural and urban areas of the Northeast. This survey was conducted by BEMFAM (Civil Society for Family Welfare) based on a total sample of 6,733 women aged 15-44. The total number of complete interviews is 5,892 for Brazil as whole and 887; 938 and 2,007 women, respectively for Rio de Janeiro, São Paulo and the Northeast. The survey was carried out between May and August and the sample coverage was 95%, excluding the rural areas of the North region. Women's and husband's socio-economic background are also included in the questionnaire. It has been shown that information about income in the 1986 DHS is not consistent and questions about ethnicity were not asked. In these cases and when the disaggregation by socio-economic variables results in a statistically small sample numbers, the 1986 PNAD data are used instead.

The 1991 DHS interviewed 6,222 women aged 15-49 in the Northeast over the period of August-December. The sample is representative for the Northeast as a whole, rural and urban areas and the nine states which compound the region. As this data set refers only to the Northeast, they are used only in Chapter 8 to investigate if the Northeast fertility is converging towards the Rio de Janeiro or São Paulo fertility patterns.

1.5.3 Other Sources

The other sources used are some published data from the 1986 PNAD, the Contraceptive Prevalence Survey (CPS) and the National Investigation of Human Reproduction (NIHR). Some reference to other local surveys will made in several chapters of this thesis. The PNAD is an annual survey which aims to collect information about socio-economic conditions of population, especially labour force. Periodically, special questionnaires are included aiming at further investigation of specific subjects. In 1984, the subject was birth and nuptiality histories and in 1986, contraceptive history. The sample is representative at national level and at eight regions: North, Northeast, Rio de Janeiro, São Paulo, Minas Gerais and Espirito Santo, Central West, South and the Federal District.

The second survey, the CPS, was carried out during 1979-81 and covered five Northeastern states, Piauí, Paraíba, Pernambuco, Rio Grande do Norte and Bahia; one state of the North region, Amazonas; the state of São Paulo; and three states of the South region, Paraná, Santa Catarina and Rio Grande do Sul. The five Northeastern states accounted for 64.3% of the Northeast population in 1980. The main objective was to collect information about child and maternal health and family planning. The last survey, the National Investigation of Human Reproduction (NIHR) was conducted in nine Brazilian local areas between 1975 and 1977. Among these nine areas, three are located in the Northeast region, rural Parnaiba, urban Parnaiba and Recife, and two in São Paulo, Sertãozinho and São José dos Campos. This survey gathered maternity, contraceptive and nuptiality histories.

1.6-THESIS OUTLINE

This thesis is composed of nine chapters including this introduction. Chapter 2 describes the general demographic and socio-economic characteristics of Brazil as a whole and of the three study studied areas. This provides a contextual background for the fertility analysis presented in the following chapters. The three study areas, Rio de Janeiro, São Paulo and the Northeast, have large socio-economic differences. The Northeast is the poorest region of the country and the least urbanized. It had the highest illiteracy rate as well as the highest fertility and infant mortality. Both São Paulo and Rio are located in the richest region of the country, the Southeast, but they are also quite different in social, economic and cultural terms. These differences are rooted in colonial times. Rio de Janeiro had economic, political, cultural and administrative dominance in Brazil until up the 1960s. After this date, São Paulo took over the first position in terms of economic development but Rio de Janeiro has kept its advantageous position in terms of education, cultural and modern values.

The empirical analysis begins in Chapter 3. All analyses refer to the three areas portrayed in Chapter 2. Chapter 3 seeks to describe the principal fertility trends and patterns of family formation over this century. Cohort and period fertility rates are used to measure fertility movements. The objective is to evaluate whether these movements followed a configuration described in demographic transition theory. The pattern of family formation is also studied through its onset, marriage and first birth, spacing, parity progression ratios and stopping, i.e. the Coale Trussel index of fertility control. This attempts at evaluating the impact of each strategy of reproduction on fertility movements. The last section measures the impact of declining childhood mortality on fertility thorough *proxy* measures of net fertility. Whether fertility decline is a result of an adjustment to the mortality decline or it represents a new behaviour is also investigated.

Chapter 4 analyses the demographic components, the proximate determinants, of fertility decline and the regional differentials and measures their impact on fertility levels. Each one of these determinants- marriage, breastfeeding, contraception and abortion -is analyzed separately and their combined effect on fertility rates is also assessed. Some attention is given to other factors, such as primary sterility and stillbirth, which affect fecundability. Also, different strategies of contraception are evaluated in terms of their effect on fertility.

The objective of Chapter 5 is to analyze fertility trends by socio-economic variables and assesses the relative contribution of changes in these variables to fertility decline and the regional differentials. The variables considered are: current residence, migration status, ethnicity, income, education and women's work status. Strategies of family formation such as marriage, contraception and measures of stopping are assessed for each group. The chapter also addresses the question of whether regional differences would remain under the same socio-economic conditions.

Chapter 6 examines in more detail regional differences in the family building process, onset, spacing and stopping of reproduction. The regional fertility trends are examined from a birth order perspective controlled by the same set of socio-economic and demographic variables used in Chapter 5 but adding infant mortality and contraception. Measures of the *quantum* and *tempo* of fertility are estimated. This approach provides a means for determining if fertility changes and differences can be attributed to changing reproductive patterns at low or high parities.

The objective of Chapter 7 is to investigate the existence of preferences about family size (*conscious choice*) and the extent to which reproductive behaviour is an outcome of these preferences. It also seeks to identify the impact of social actors such as the mass media, health services and the Church, in shaping these preferences and in women's behaviour towards their achievement. It assumes that these actors play some role in diffusing the value of a small family and in legitimating attitudes towards this target. However, it is also assumed that this impact is regionally differentiated. The demographic and socio- economic variables outlined in the previous section are considered as controls.. By attitudes is considered contraception prevalence and also strategies of contraception.

Chapter 8 attempts to look to the future addressing the question of convergence in fertility rates. Fertility changes over 1986-91 are analyzed looking to find some indication of whether the Northeast and Sao Paulo fertility rates are moving towards Rio fertility pattern. Projected fertility rates and patterns of family formation are also given. Finally, Chapter 9 discusses the results.

Chapter 2
BRAZIL AND ITS MAIN CHARACTERISTICS

2.1 GENERAL ASPECTS

The aim of this chapter is to give some information about the socio-economic development of Brazil and the three study areas over this century. In other words, it provides a general background to the fertility transition analysis. It is divided up into six sections this being the first one which describes the main characteristics of Brazil. The following three sections (2.2, 2.3 and 2.4) offer a brief description of the historical economic, social and demographic trends. Section 2.5 summarizes the main governmental efforts in population matters. Section 2.6 portrays the three study areas presenting their main differences.

Brazil is the fifth largest country in the world, whose size (3.27m square miles) is comparable to the USA, China or Australia. From north to south it extends 2,685 miles and from east to west 2,690 miles. Its land frontier of 9,768 miles borders all the South American countries other than Chile and Ecuador.

Brazil is a Federal Republic composed of 26 states and one Federal District where the national capital, Brasília, is located (see Map 1). The national government has jurisdiction over national defence and security, foreign affairs, fiscal and monetary policy, telecommunication, electric energy and electoral law. Other matters are left to the States, which have their own Governors and Legislative Assemblies. The states are composed of municipalities. There were 4,491 municipalities in 1991.

According to the Demographic Census of 1991, the Brazilian population was about 147 million inhabitants at that time, making it the sixth most populous country in the world. The average annual population growth rate was quite high in the recent past (about 3.0% a year over 1950-70) but it has dramatically declined since then (1.9% over 1980-91) as a result of rapid fertility decline. The overall population density was low, 17.3

persons per square kilometre. However, this figure is deceptive because of the high population density of the coastal area and the very low density of the interior. About 75% of the population lived in urban areas and were heavily concentrated on the coastal strip. The proportion of the population living in cities of more than 20,000 inhabitants has dramatically increased since 1940. It rose from 16.0% in 1940 to 41.0% in 1991. The two largest cities are São Paulo (9.63 m) and Rio de Janeiro (5.47 m), both capitals of states of the same name.

Map 1 Brazil: The three studied areas

Racially, the population was divided as follows according to the 1991 Demographic Census: 55.3% white, 39.3% of mixed race and 4.9% black, the remaining 0.5% representing oriental and other races. The illiteracy rate was 17.8% of the population aged 10 and over in 1991. The official language is Portuguese and the religion is Roman Catholic.

Brazil has the largest and the most complex economy in Latin America. In 1985, the gross national product (GNP) reached values around USA $208 billions and per capita income was USA $1,857.1 Nevertheless, the country is characterized by large regional and socio-economic differences that have resulted in great differences in regional demographic trends. Brazilian geographers usually divide the country into five major regions for purposes of social and economic description (see Map 1 and Table 2.1). Two large regions can be taken to illustrate such differences. One is wealthy, urbanized, industrialized and literate (the Southeast) and the other poor, rural and illiterate (the Northeast). In between, there are three other regions (the South, the Central West and the North).

Table 2.1
SOCIO-ECONOMIC CHARACTERISTICS OF BRAZILIAN REGIONS

REGION	Population 1,000[1]	Area %[1]	Urban %[1]	GNP %[2]	Illiteracy %[3]	Per Capita Income[2]
North	10,257	45.3	57.8	3.9	12	1216.6
Northeast	42,470	18.3	60.6	12.9	36	772.7
Southeast	62,661	10.8	88.0	57.6	11	2665.1
South	22,117	6.8	74.1	16.7	11	2001.1
C West	9,412	18.9	79.2	8.7	16	1507.8
Brazil	146,917	100.0	75.5	100.0	19	1857.1

Sources: [1] IBGE (1993) pp 2-8 (Figures refer to 1991).
[2] IBGE (1986), p 1045 and p 123 (Figures refer to 1985 and 1980, respectively)
[3] IBGE (1990), p 171 (Figures refer to 1988 and to people aged over 10 years)

The most populous of these regions is the Southeast which was responsible for 42.6% of the national total in 1991. Although it occupies only 10.8% of Brazil land area, it includes the major industrial centres, São Paulo, Rio de Janeiro and Belo Horizonte, which together accounted for 57.6% of the total GNP and 65.8% of the manufacturing output.[123] The region dominates Brazil economically in all sectors, including agriculture. Further, per capita income is over three times as high as that of the Northeast region. The Northeast is Brazil's poorest region with 28.9% of the total population and 18.3% of the land area. Its share on Brazil's rural population was 46.4% according to the 1991 Demographic Census. It had the highest total fertility rate in the first half of the 1980s (5.1 compared with 2.7 for the Southeast), the highest infant mortality rate (121 per thousand compared with 74.5 per thousand in the Southeast)[124] in 1970-80 and the highest illiteracy rate in Brazil (see Table 2.1). This region accounted for only 12.9% of the Brazilian GNP in 1985.

2.2-ECONOMIC BACKGROUND

2.2.1 The Main Export Product Cycles[125]

Brazil was predominantly an agrarian economy for most of its history. From the colonial period (1500-1800) until the 1930s its economy was heavily based upon the export of a number of commodities. Hence, its economic and demographic history is commonly divided into periods characterized by these products. The first of them was brazilwood, a valuable dye product from which the country took its name. The early colonists settled the coastal region during the sixteenth century. By the mid 1500s the European population of the colony grew to about one hundred thousands and the brazilwood forests were depleted.[126] Sugar then became Brazil's principal export product in response to increased demand from Western Europe. Sugar dominated the economic and political life of Brazil during much of the colonial period, from the mid sixteenth to the early nineteenth century.

The first plantations of sugar cane were located along the humid north-eastern seaboard. Sugar production was highly labour-intensive and required substantial capital

[123] These figures refer to 1985. See: IBGE (1986), p 50.

[124] See IBGE (1990), pp 84-4.

[125] This sub section is heavily based on Wood and Carvalho (1988), pp 50-8.

[126] See Simonsen (1969), p 121, quoted by Wood and Carvalho (1988), p 50.

investment. The practice of handing out large tracts of land and the sizeable investment that sugar required laid the foundation for the emergence of a powerful landed elite. The establishment of large plantations and the failure to develop a more diversified economy meant that about 90% of the income generated by the sugar economy remained concentrated in the hands of sugar mill and plantation owners.[127] Once set in motion, the plantation system showed a remarkable resistance to fragmentation. Due to the indivisibility of land and mill, sugar-cane plantations have not usually been split upon inheritance. Hence, the concentration of land in the Northeast is today the highest in the country.

As the demand for labour on the plantations far exceeded the available supply, slavery became the solution to the planters' labour shortage. Forced migrants were brought from Africa. They influenced the cultural and racial profile of Brazil's growing population especially in the Northeast. The slave mode of production also established racial inequalities that were not eliminated by the abolition of slavery in the nineteenth century. They are still present in the Brazilian economy as an important social consequence of the sugar cane economy.

Although sugar was still important in terms of volume of production in the eighteenth century, its profitability was already declining as a consequence of the reduction in the international prices combined with the rising cost of slaves. The discovery of gold in Minas Gerais in 1695 stimulated the transference of the economic centre of the country to central and southern Brazil and the Northeast economy declined. The new area attracted migrants from southern Brazil and Portugal and slaves from the Northeast. This influx was responsible for the start of the urbanization process. Numerous small towns and cities appeared at that time.[128] The gold cycle lasted till the last quarter of the eighteenth century.

Cotton and rubber were other products that played some role in Brazilian demographic and economic history. Cotton production was important in Ceará and

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[127] See Furtado (1963), p 48 quoted by Wood and Carvalho (1988), p 51.

[128] See Baer (1965), quoted by Wood and Carvalho, p 53.

Maranhão, in the Northeast, during the first half of the nineteenth century. Rubber exploitation led thousands of Northeast workers to Amazonia in the late nineteenth century. By the 1920s, this cycle was already over.

The most important impact on the contemporary structure of the Brazilian economy was that produced by coffee cultivation. By the 1830s coffee was Brazil's most important and lucrative export crop. Production for export began in the north of the state of Rio de Janeiro. This did not last very long as already in the 1870s soil erosion and insect damage had reduced crops yields there. Cultivation then spread westward into the interior of the state of São Paulo. There, production was so successful that by the end of the nineteenth century, Brazil accounted for three quarters of the world's total supply. The latest phase of the expansion of coffee cultivation was into the state of Paraná in the South which reached its peak in the mid 1950s.

Coffee was a highly labour intensive crop like sugar but it required less capital. Land was abundant and the expansion of coffee was limited only by the shortage of labour. As slavery was abolished in 1888, workers were actively recruited in Europe, subsidized by the State. The influx of immigrants reached a peak in 1891-1900 when over one million people, from Portugal, Spain and mainly from Italy, entered the country.[129] These migrants also played an important role in the cultural and racial profile of the São Paulo population.

The impact of the coffee boom was very strong in both rural and urban São Paulo. The accumulation of capital that resulted from the coffee sales provided funds for roads, railways and light industry. This also led to a more active market economy, increasing the money circulation. Banks and other credit institutions were established. According to Dean, by the 1920s São Paulo had replaced the federal capital of Brazil, Rio de Janeiro, as the most important industrial centre. By the 1940s it possessed the largest agglomeration of manufacturing capacity in Latin America.[130] This position has been maintained.

[129] See Smith (1972), quoted by Wood and Carvalho (1988), p 54.

[130] See Dean (1969), p 13.

2.2.2-Industrial Growth

Since the end of World War II the Brazilian economy has grown in size and complexity as a result of industrial growth. This growth has been subject to cyclical downturns. Nevertheless, a long-run perspective indicates that Brazil's economy experienced an average annual rate of growth of around 4.6% between 1921 and 1987 (see Figure 2.1). The dramatic increase observed in the gross domestic product from after the World War II (1946) to 1980 was a consequence of an increase in industrial production. Two growth cycles are considered of particular importance: the import substitution industrialization from the early 1950s through the mid 1960s and the export promotion cycle from the 1970s onwards. According to Haddad's estimates, the mean annual rate of growth of industrial production over 1945-71 was 8.3% while the comparable rate for agriculture was 4.4%.[131] This is considered a result of government economic policies aimed at promoting industrial growth. The national government was responsible for investments in basic infrastructure, namely transport, energy, housing, sewage, communication, steel, etc. This strategy was reinforced during the military regime which started in 1964. A new industrialization boom was observed at that time, especially during 1969-74 when industrial product grew by an annual average of 12.2%.[132] The auto industry played a key role in this boom.

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[131] See Haddad (1974), quoted by Merrick and Graham (1979), p 23.

[132] See Suzigan (1976), quoted by Merrick and Graham (1979), p 23.

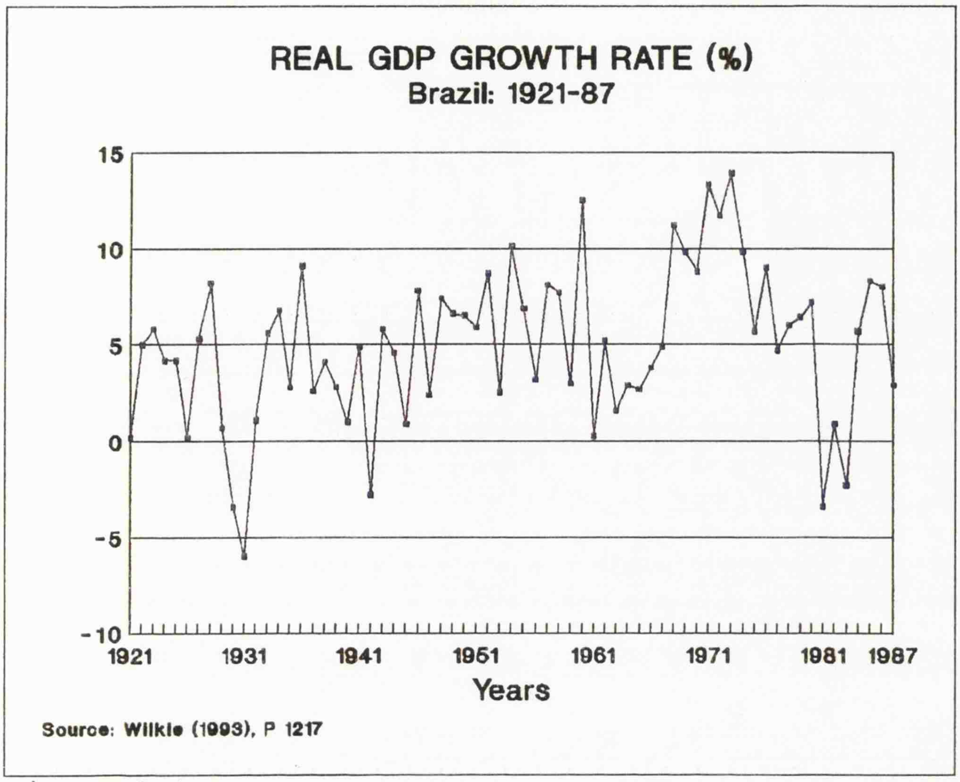

Figure 2.1

The period of economic prosperity lasted until the early 1980s when a severe economic crisis affected the whole society. The whole country was sent into a severe recession during 1981-3 (see Figure 2.1). The annual rates of change in the gross domestic product reflected the magnitude of the crisis. The indicator of economic output growth fell from +7.2% in 1980 to -3.4% in 1981. This decline continued from 1981 to 1983. Government consumption declined 2.2% during 1981-85 and gross fixed capital formation was severely reduced at 5.5% at the same time.[133] The inflation rate jumped from an annual rate of 106% in 1981 to 227% in 1985.[134] Economic growth resumed in 1984 and the annual rate of change in the gross domestic product increased from -3.2% in 1983 to 4.5% in 1984 and 8.3% in 1985.

[133] See Lyold Bank (1986) p 5.

[134] See Lyold Bank (1986) p 7.

Industrialization brought sweeping changes in the social structure, modified the balance of power between urban and rural interest groups and significantly altered national institutions. New development ideologies that were to guide state economic policies in the post-war years accompanied these changes. By the 1940s, significant transformations in the labour market were on process as well as large migration movements from rural areas to urban areas. Internal migration from the Northeast towards Rio de Janeiro and São Paulo over 1950-80 was also very large and played an important role in keeping down wages. The net effect of the combination of high technology industry with these two kinds of movements was a higher increase in real wages of a small fraction of skilled workers. Differences among social classes were thus enlarged.

2.2.3 Growth and Structure of the Brazilian Labour Force

A long term analysis of labour force participation, 1872-1970, was undertaken by Merrick and Graham.[135] The main conclusions based on the 1920-1970 period are summarized here. The trends are not very clear before the 1920 Census which was associated with data defectiveness in the previous censuses. As a measure of the labour force, the economically active population (EAP) from the Demographic Census or the General Household Surveys (PNAD) is used here. It refers to the population aged ten years and over who were working at the time of the Census or had been working in the previous twelve months. Since the 1970 Census people who were looking for their first job have also been included.

The trends and composition of the male EAP are relatively smooth. Their participation, measured either by the crude activity rate or by the refined activity rate increased until 1940. Marked shifts from agricultural to non-agricultural activities took place over the period. In 1920, 71.2% of the active male population was engaged in agricultural activities and 10.3% in industrial ones. In 1970, the comparable percentages were 51% and 20.1%, respectively. Most of the sectoral shifts towards non-agricultural activities started in the 1930s.[136]

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[135] See Merrick and Graham (1979), pp 156-82.

[136] See Merrick and Graham (1979), p 158.

Female trends are more complex than male ones. Both crude activity rates and refined activity rates increased dramatically, especially during the 1950s when the refined rate rose from 13.6% to 16.5%. This growth continued in the following decade when this rate reached 18.4%. The increase was spread across several age categories and included both single and married women. The rise in activity by the 20-29 age group was associated by Merrick and Graham with migration and urbanization as well as increase in female education. In 1920, 41.5% of the female labour force was employed in agriculture and 29.1% in the service sector. In 1970, this relation was significatively changed with the services sector accounting for 69.1% of female employment. The comparable percentage for agriculture was 20.5%.[137] It is important to stress that a large proportion of the women employed by the service sector were domestic servants.

The active population carried on growing during the 1970s and 1980s as a result of a more pronounced increase in the female activity rate and also of a higher increase of the population at active age, 20-40 years. This increase is a result of the highest population growth observed in the 1950s and 1960s, a cohort effect. Table 2.2 shows the crude and refined activity rates according to the 1970 and the 1980 Censuses and the distribution of the population by sex and the three main economic sectors. The highest increase in the crude activity rate observed for both sexes shows the cohort effect previously mentioned. By the same token, only the female population exhibited an increase in the refined rate which confirms the higher increase in the participation of the female population. Shifts in the distribution of the active population from agricultural to non agricultural sectors continued over the period. For the total population, this percentage declined from 44.3% to 29.3%. This was paralleled by a huge rural-urban migration flow of about 16 million people.[138] The highest increase in labour force participation was observed in industry for both sexes.

[137] See Merrick and Graham (1979), p 158.

[138] See Camarano et al (1989), p 17.

Table 2.2
ECONOMICALLY ACTIVE POPULATION IN THE MAIN ECONOMIC SECTORS BY SEX (%)
Brazil : 1970-1980

Sector	1970	1980
MALES		
Agriculture, Forestry and Fishing	50.6	35.2
Industry	19.9	28.6
Services	29.5	36.2
Crude Activity Rate	50.5	53.1
Refined Activity Rate	71.9	72.4
FEMALES		
Agriculture, Forestry and Fishing	20.4	13.6
Industry	10.3	15.2
Services	69.3	71.3
Crude Activity Rate	13.2	19.8
Refined Activity Rate	18.5	26.7
TOTAL		
Agriculture, Forestry and Fishing	44.3	29.3
Industry	17.9	24.9
Services	37.8	45.8
Crude Activity Rate	31.7	36.3
Refined Activity Rate	44.9	49.2

Source: 1970 and 1980 Demographic Censuses

Analysis of the labour force in the 1980s must be done using PNAD data as the results of the 1991 Census have not come out yet. As the procedures used in the two sources are different a comparison of labour force participation between the 1970s and the 1980s is made difficult. Hence, the 1980s trends are analyzed separately in Figure 2.2. This presents the yearly refined activity rate through 1981-90 by sex. The economically active population increased more than the population aged 10 years and over as pointed out by the increasing rates for both sexes. The largest increase was observed for the female population and happened in all marital status groups. The increase in female population was observed in all age groups and changed the age specific activity rates pattern. Until 1980, these rates peaked in the group 20-29 years. During the 1980s, the pattern was similar to the male one; females rates were almost constant around 52% among the age group 20-40 years.[139]

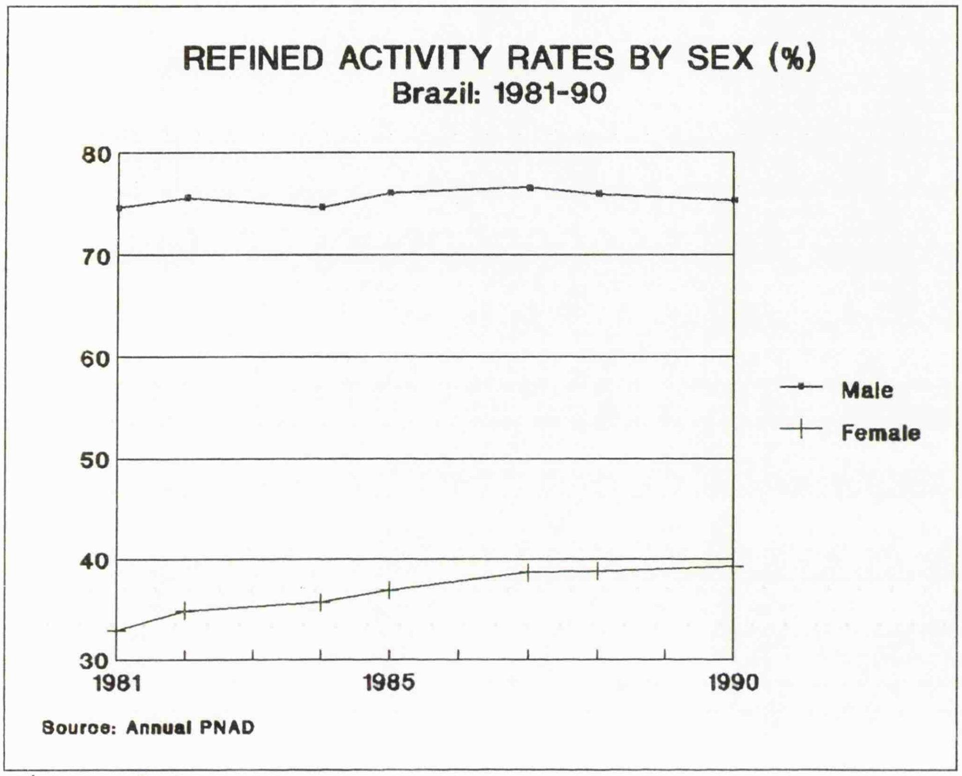

Figure 2.2

The long term rise in female labour force participation has been associated with structural changes in Brazilian society, especially with increasing education. Another point raised by the literature refers to the growth observed during the 1980s. This takes the modernization factor into account but emphasizes the role played by the reduction in real wages and consequently of the family income observed at that time. It is suggested that women have been participating in the labour force in order to supplement family income. This view is based on the increase of female employment in low wage activities.[140]

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[139] See Camarano and Beltrão (1991), pp 14-5.

[140] See: Martine (1995), p 25.

2.3- SOCIAL CONDITIONS

2.3.1 Indicators of Welfare

Changes in the structure of economic production in Brazil were accompanied by an increase in school attendance and a reduction of illiteracy, by an expansion in health related services and in social security coverage. This was a result of social policies adopted since the late 1960s. The most important were mass education programs, mass preventive health care, especially the development of widespread immunization and social security for the elderly. As a result of these policies and an increase in average wages, the Brazilian population has enjoyed a higher standard of living. This is illustrated by the time period comparison of some indicators of social conditions and by changes in the ownership of some durable goods (see Table 2.3).

Table 2.3
TIME PERIOD TRENDS IN SOME MEASURES OF BRAZILIAN WELFARE
1950-1988

Sector	1950(1)	1988(5)
% Population Aged 10 and over		
Illiterate	39.4	18.5
With University Degree		
Male	0.5	2.3(4)
Female	0.1	1.9(4)
Hospitals (per 1000)	NS	0.2
Medical Personnel (per 1000)	0.1	2.1
% EAP with Social Security	23.1(2)	50.7
% Piped Water *	57.4(2)	89.6
% Sewage or Septic Tank *	26.6(3)	43.2(4)
% Electricity *	45.7(3)	85.9
% Television *	24.1(3)	71.5

Source: (1) 1950 Demographic Census
(2) Wilkie (1993), p 201 (it refers to 1960)
(3) 1970 Demographic Census
(4) 1980 Demographic Census
(5) IBGE (1988)
Note: * Refers to households
NS = Not Significant

It is clear that one important result of the above mentioned social policies was an increase in educational attainment. Between 1950 and 1988 the percentage of the population illiterate decreased by 49.2%. A large increase was observed in the proportion of the population with a university degree. This was true for both sexes but the relative increase for the proportion of females was more marked than for males. This increase, which benefited all regions and socio-economic groups, was particularly relevant to fertility behaviour in the 1970s and the 1980s.[141] Other important achievements occurred over the considered period: an increase in the coverage of health services and social security as measured by the expansion of hospitals, medical personnel and the percentage of the population who contributed to social security; and a marked growth in the percentage of households with television. It nearly tripled over the period.

2.3.2 Inequalities

The above mentioned social and economic changes were, however, paralleled by an accentuated income concentration and continued widespread poverty. Data on the relative distribution of income became available only in the 1960 Census. According to this Census, the top 20% of the income-earning population appropriated 54.8% of all income while the share of income received by the bottom 40% was 11.6% of the total. This income distribution can be summarized by the Gini coefficient which was estimated as 0.497 in 1960. The Gini coefficients from 1960 to 1988 are shown in Table 2.4. The increase in the coefficients points to a rising inequalities in the following decades. It was shown in the 1980 Demographic Census that the top 20% of the income-earning population had increased their share to 63.3% of all income while the share of income received by the bottom 40% was reduced to 9.8% of the total. The Gini coefficient increased to 0.590. The 1980s saw a further continuation of the income concentration as indicated by a higher coefficient in 1988.

[141] Wood and Carvalho calculated the increase in the percentage of women aged 20-34 with more than four years of schooling between 1970 and 1980 for four groups of household income. These percentages are; 6.5%, 7.4%, 7.1% and 12.1% with the first percentage referring to the poorest group and the last to the richest one. See Wood and Carvalho (1988), p 171.

Table 2.4
GINI COEFFICIENTS BY TIME PERIOD
Brazil 1960-1988

YEAR	Coefficients
1960	0.497
1970	0.565
1980	0.590
1988 (1)	0.601

Sources: 1960, 1970 and 1980 Demographic Censuses
(1) IBGE, 1988 PNAD

Measures of poverty calculated by Singer (1995) point to a stronger trend in impoverishment of the Brazilian population in the 1980s. While between 1970 and 1980 there was a decline from 39.3% to 24.0% in the proportion of the population located below the poverty line, this rate increased again to 39.3% in 1988.[142] In terms of its regional distribution, poverty reaches its heaviest concentration in the Northeast (see Table 2.5). Although this area contained only 26% of Brazilian families, it accounted for 50% of poor families. In the remainder of the areas, this balance was the other way around.

Table 2.5
REGIONAL DISTRIBUTION OF POOR FAMILIES (%)
1988

REGIONS	FAMILIES	POOR FAMILIES (1)
North	2.9	2.4
Northeast	26.2	50.3
Southeast	47.3	28.0
South	16.5	13.3
Central West	6.9	5.6
Total	100.0	100.0

Source: IBGE, 1988 PNAD
Note : (1) Families whose monthly income was under 1 minimum wage

The regional concentration of poverty is one of the results of regional economic differences. Economic growth has only lessened but not eliminated sharp regional inequalities. Although governmental efforts were made during the 1960s attempting to

[142] Quoted by Berquó (1995), pp 3-4.

counteract this trend, the regional differences are still very large. Table 2.6 displays the regional distribution of the population and the gross national product in 1950 and 1985. It may be seen some hints of a reduction in the concentration in both regional population and production. Nevertheless, this movement has been rather towards the Central West, North and South regions than in the direction of the Northeast. Indeed, this area has lost importance in terms of population and GNP.[143]

Table 2.6
REGIONAL DISTRIBUTION OF POPULATION AND GROSS NATIONAL PRODUCT : 1950 AND 1980 (%)

REGIONS	POPULATION 1950[1]	1985[2]	GNP 1949[3]	1985[4]
North	3.5	5.4	1.7	4.4
Northeast	34.6	29.3	14.1	13.6
Southeast	43.4	43.1	66.5	58.2
South	15.1	15.7	15.9	17.7
C West	3.3	5.1	1.8	6.2
Total	100.0	100.0	100.0	100.0

Sources: [1] 1950 Demographic Census
[2] Camarano and Beltrão (1990), p 157
[3] Carvalho and Wood, p. 72
[4] IBGE, (1986) p 1003

2.4-DEMOGRAPHIC TRENDS

According to Merrick and Graham, long term analysis of the Brazilian population is "a hazardous exercise at best".[144] The first national census was undertaken in 1872 and was affected by political instability as well as administrative inefficiency. Population information prior to that time came from ecclesiastical and official headcounts whose incomplete coverage and misleading corrections make their use problematic. Estimates quoted by Merrick and Graham point to a population of 3.25 million inhabitants in 1798.

[143] Further analysis of the regional inequalities will be presented in section 2.6.

[144] See Merrick and Graham (1979), p 25

The largest population group at that time was formed by African slaves (48.7%) followed by Europeans (31.1%). The free African population accounted for 12.2%.[145]

The 1872 Census pointed to a population of 9.93 million for Brazil as a whole. Considering the 1798 population estimate, this indicates an average annual growth rate of 1.5% over the period The European population grew at faster pace than the other groups. The group made up by Africans was still the most important in 1872 but the slave population was much smaller than the free population. The second group in importance was that composed of Europeans. The importance of the indigenous segment was not very marked in 1872. [146] Mortara estimated for the period 1840-70 an average annual rate of natural increase of 1.4%.[147]

2.4.1 Population Growth: 1872-1990

According to Merrick and Graham one of the most striking features of the Brazilian population is its sustained long term growth. Their estimates of the average annual growth rate for the period 1870-1970 was 2.3%.[148] Table 2.7 shows estimates of the components of population change over 1872-1990. An examination of these components highlights a substantial increase in the growth rate until 1960. International migration was the most important contributor to Brazilian population growth over 1871-1900, especially during 1890-1900. Its reduction was responsible for the decline in total population increase over 1900-40. Population growth peaked during 1950-70. A reduction in the crude death rate was responsible for this increase in both periods. Population growth rates started to decline in the 1960s as a result of a reduction in the birth rate. The decline in crude birth rate started during the 1960s and accelerated in the following decades, offsetting the decline in the death rates. This was responsible for a dramatic and rapid reduction in the pace of population growth. The most recent population projection

[145] See Merrick and Graham (1979), p 29.

[146] Quoted by Merrick and Graham (1979), P 29.

[147] Quoted by Merrick and Graham (1979), P 37.

[148] See Merrick and Graham (1979), pp 30-1.

assmes that tht annual growth rate will fall to 1.3% by the end of the century, impying a drop of 57% in fifty years.[149]

Table 2.7
COMPONENTS OF POPULATION CHANGE
(Average Annual Rates Per Thousand)
1870-1990

TIME PERIOD	Crude Birth	Crude Death	Natural Increase	Net Migration	Net Increase
1871-90[(1)]	46.6	29.5	17.1	2.0	19.1
1891-1900[(1)]	46.0	27.8	18.2	6.0	24.2
1901-20[(1)]	45.0	26.4	18.6	2.2	21.2
1921-40[(1)]	43.5	24.8	18.7	1.8	20.5
1941-50[(1)]	44.4	20.0	23.4	0.4	23.8
1951-60[(1)]	43.3	14.2	29.1	0.9	30.0
1961-70[(1)]	40.8	13.0	27.8	0.1	27.9
1971-80[(2)]	34.0	9.0	24.0	0.0	24.0
1980-85[(2)]	30.6	8.4	22.2	0.0	22.2
1985-90[(2)]	28.6	7.9	20.7	0.0	20.7

Sources: [(1)] Merrick and Graham (1979), p 37
[(2)] IBGE (1990), p 85

2.4.2 Fertility Trends

As outlined in Chapter 1, estimates of fertility trends have varied substantially. Frias and Carvalho (1994) provided the longest fertility series (1933-73) known for Brazil as a whole and the five major regions. These are the used in this sub-section. Apart from this, the estimates used are those produced in this thesis using the same methodology as these authors. For 1980-1985, figures published by Silva et al (1990) based on the 1986 DHS data are used (see Figure 2.3). According to these data, total fertility at the national level declined by about 6% during the 1930s but was then nearly constant until 1963. Since then fertility rates have dramatically declined. The total fertility rate dropped from 6.0 in 1963 to 3.4 in the first half of the 1980s.

[149] See IBGE (1994), P 22.

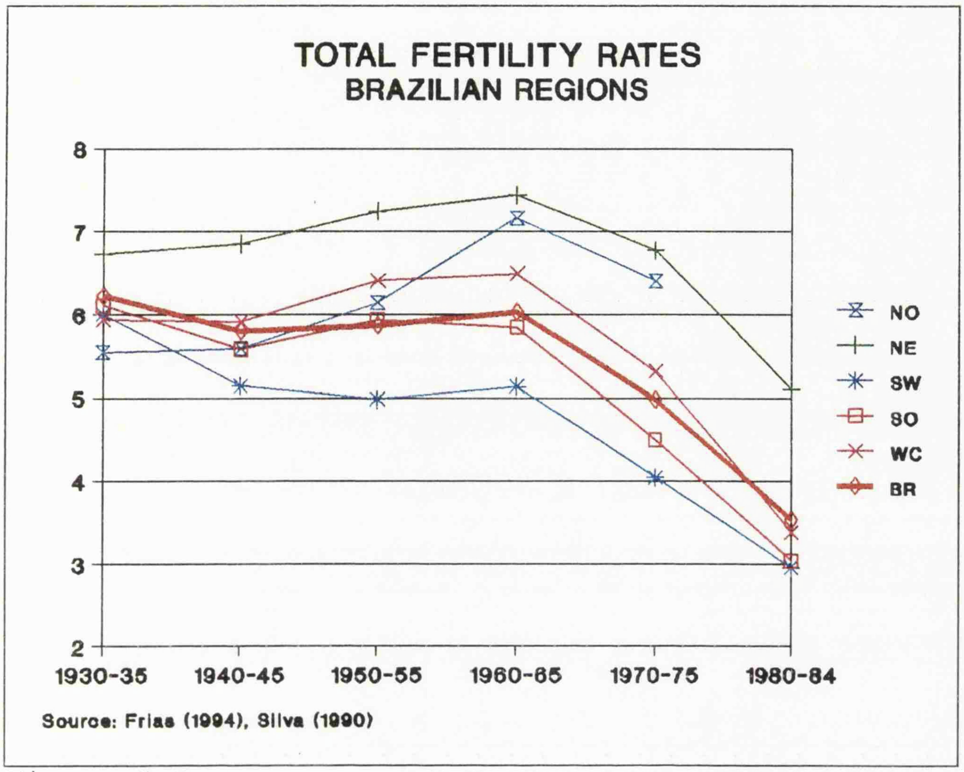

Figure 2.3

This national trend masks major regional fertility differentials. By the time the Southeast was experiencing some fertility decline, other regions' fertility was increasing (see Figure 2.3). Fertility decline took place in all regions in the 1960s but at a varying pace. For instance, the fall in the South TFR was 23% yet in the Northeast it was only 8%. The other regions' percentage decline was in between. During the 1980s the fall was more marked in the Northeast where the TFR dropped from 6.8 to 5.4. Nevertheless, this rate is still very high compared to the 2.7 observed in the Southeast.

The first fertility estimates by urban-rural residence come from the 1970 Census and refer to the period 1965-70. The figures produced by Wood and Carvalho point to large differences. For Brazil as a whole, rural women had, on average, 2.9 children more than urban women: the TFRs were 7.7 and 4.8, respectively. As fertility reduction was more marked in rural than in urban areas during the 1970s and 1980s, this difference narrowed to 2.3 in the first half of the 1980s when the TFRs were 5.3 and 3.0.[150]

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[150] See: Wood and Carvalho (1988), pp 156-7.

Differences in TFRs by income have also been large. Again, the first estimates are available from the 1970 Census and refer to 1965-70. According to Wood and Carvalho estimates, poor women had a TFR of 7.5 and rich women of 3.3. The fertility decline observed in the 1970s narrowed the fertility differences by income; from 4.2 to 3.2 children. Wood and Carvalho also measured fertility change during the 1970s, breaking it down by rural and urban areas and income groups. In urban places the percentage of fertility decline was higher among the two lower income groups. The reverse was true in rural areas. Large rates of change occurred among the two higher strata of household income. However, there were still marked differences between fertility rates by residence and income groups. The TFR among rich urban women was 2.8 and among the rural poor it was 6.6 in the late 1970s[151]

2.4.3 Mortality Trends

Figure 2.4 displays estimates of national and regional trends in the expectation of life at birth. There was a substantial rise in this indicator at all levels as a result of mortality decline. From 1935-40 to 1975-80, the Brazilian expectation of life at birth increased by 17.4 years, from 42.7 to 60.1 years. The largest increase took place in the 1970s. Spatial differences in socio-economic development are clearly reflected in the sharp regional differences in life expectancy. In 1935-40, the average length of life in the Northeast was 38.2 years and the gap between this area and the South was 11.9 years. The overall decline in mortality that took place in later decades did not eliminate these inequalities. Indeed, the gap between these two regions increased to 15.4 years in 1975-80. Camarano and Beltrão point to a reduction of these differences to 11 years in the first half of the 1980s.[152]

[151] By poor, it is meant women belonging to a family which received approximately Cr$ 150 or less than. By rich, it is meant women who belonged to a family which received a monthly income of more than Cr$ 500. See: Wood and Carvalho (1988), p 157.

[152] See: Camarano and Beltrão (1991), p 35.

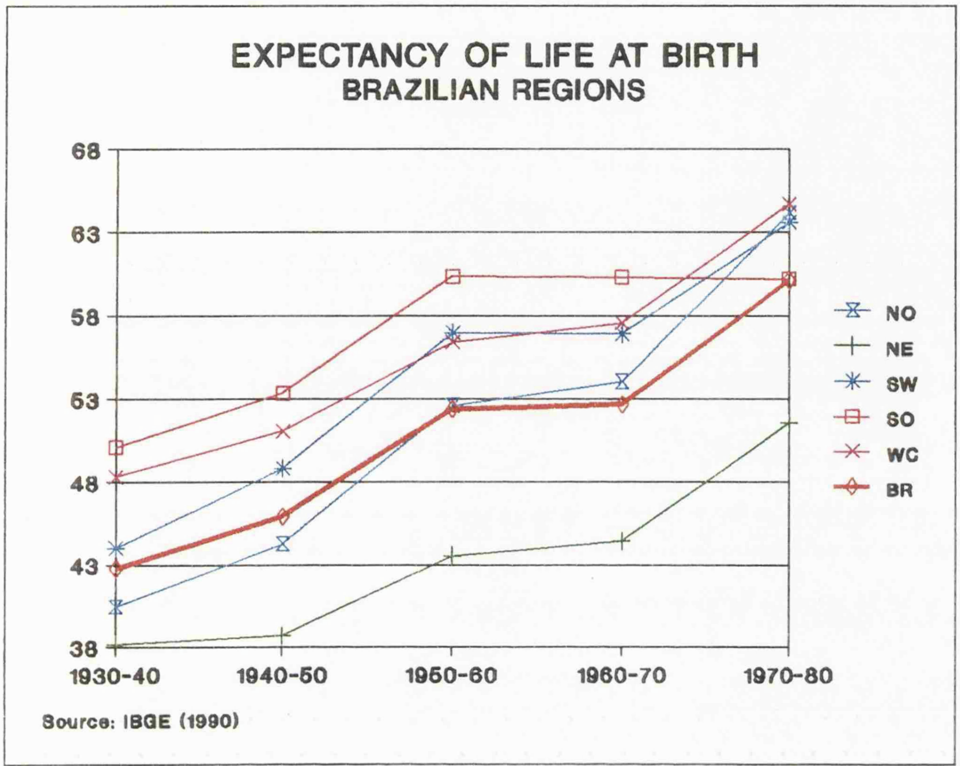

Figure 2.4

Expectation of life in urban areas (53.1 years) was only 0.8 years higher than in rural areas (52.3) in the 1960s. This difference increased to two years in the 1970s (60.8 and 58.8).[153] Larger differentials were found by Wood and Carvalho when these estimates are further broken down by income groups and rural and urban areas. Urban life expectancy was below that of rural areas for low income households. The reverse was true for families in the highest income class. This happened in both the 1960s and the 1970s. As in the fertility decline, the reduction in mortality was more marked among the two poorest groups living in urban areas and the two richest rural ones. Thus, city dwellers have a higher probability of longevity compared to those who live in rural areas if they have greater economic resources. This pattern was found in all regions, although there was variation in the income category in which the urban rate exceeded the rural rate.[154]

[153] See: IBGE (1990), p 82.

[154] See Wood and Carvalho (1988), p 102.

2.4.4 Population Distribution

2.4.4.1 By Regions

Since colonial times, Brazil's population distribution has been characterized by a high degree of concentration of settlement in a two hundred miles wide band stretching along the Atlantic coast from the Northeast to the Southern region. Table 2.8 shows that historically the Northeast and the Southeast have been the most populated regions in Brazil. They accounted for 87.2% of the total population in 1872 and 71.6% in 1991. Population redistribution reduced the share of the Northeast in the total population from 46.7% to 28.9% between 1872 to 1991. The South, Central West and North regions gained. Migration, both international and internal, as well as differential natural increase contributed to this redistribution. The most substantial changes took place over 1872-1900. The Northeast share dropped precipitously from 46.7% to 38.7% while the Southeast increased from 40.5% to 44.9% and the South from 7.3% to 10.3%. Severe droughts and prolonged stagnation in the Northeastern traditional exports, cotton and sugar, resulted in migration of free labour to the Southeast and to the North. This added to the international immigration into São Paulo were the causes cited by Merrick and Graham for this regional redistribution. Apart from these factors, they also consider the interregional transfers of slaves to the Southeast and the growing regional disparities in death rates as important causes.[155]

[155] See: Merrick and Graham (1979), pp 66-8.

Table 2.8
DISTRIBUTION OF BRAZILIAN POPULATION BY MAJOR REGIONS FOR SELECTED YEARS (%)
1872-1991

REGIONS	1872	1900	1940	1970	1991
North	3.4	4.0	3.6	3.9	6.9
Northeast	46.7	38.7	35.0	30.3	28.9
Southeast	40.5	44.9	44.5	42.7	42.6
South	7.3	10.3	13.9	17.7	15.0
C West	2.2	2.1	3.1	5.5	6.4
Total	100.0	100.0	100.0	100.0	100.0

Source: IBGE, Several Demographic Censuses

The period 1900-40 brought only slight changes in the relative population distribution. The South and the Central West increased their share at the expense of the Northeast. This trend continued over 1940-70 along with a decline in the Southeast share. This was the result of increasing migration to the frontier areas to Paraná, in the South, and to the Central West. High rates of natural increase in the frontier areas due principally to higher fertility contributed further to their increased share. Similar trends were observed over 1970-91 but at this time it was the North which increased its share as the agricultural frontier moved further north.

2.4.4.2 By Urban Rural Residence

Data for the analysis of Brazil urban-rural structure became available with the 1940 Demographic Census. As mentioned in Chapter 1, the definition of the urban population is based on administrative status rather than a minimum population size. With this definition, urban growth can result both from increase in the population of places defined as urban at the beginning of the measurement interval and from additions of new cities that passed the urban threshold in the interval. For most analytical purpose, it is the first aspect of urban growth that it is important. Many studies have already shown that the dramatic urban population growth in Brazil was mostly due to the increase in the population living in the same cities.[156]

[156] See Martine et al (1990), pp 101-9.

Merrick and Graham worked with the population of the *municipios* (municipalities) and found that in 1872, only 8% of the Brazilian population resided in localities having 20,000 or more inhabitants. These consisted of the coastal state capitals and São Paulo, capital of the state of the same name. Only three of them (Rio de Janeiro, Salvador and Recife) had populations of over 100,000 and none exceeded 500,000. During 1872-1900 São Paulo grew, on average, at 14% annually which nearly quadrupled its population. This reached 240 thousands in 1900 making it the second largest Brazilian municipality.[157]

Table 2.9 shows the distribution of the Brazilian population according to city-size categories for 1940, 1950, 1960, 1970, 1980 and 1991. Six categories are shown: five refer to size of the locality where the urban population lived and the last one to the rural population. In 1940, 31.2% of the total population lived in urban areas as defined by the Census and 19.5% resided in urban settlements with over 20,000 inhabitants. The two main cities were Rio de Janeiro, the national capital with 1,9 million inhabitants and Sao Paulo with 1,4 million inhabitants. From 1940 to 1991, the urban population increased substantially and this growth was localized in ever larger cities. In 1991, 24.5% of the population lived in rural areas and 35.2% in cities with more than 500,000 inhabitants. The number of cities with 20,000 and over increased from 50 to 560 between 1940 and 1991.

[157] See: Merrick and Graham (1979), p 187.

Table 2.9
DISTRIBUTION OF BRAZILIAN POPULATION BY SIZE CATEGORY(%)
1940-91

SIZE GROUP	1940	1950	1960	1970	1980	1991
Urban (1,000)						
500 and over	10.8	14.2	21.3	26.7	32.3	35.2
100-499	5.1	4.9	4.4	6.5	9.6	10.7
50-099	1.7	2.2	2.6	3.2	4.1	5.4
20-049	1.9	3.0	4.3	5.1	6.3	7.6
< 20	11.7	11.9	12.7	14.0	15.5	16.4
Rural	68.8	63.8	54.6	44.1	32.4	24.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: IBGE, Several Demographic Censuses

As another important feature of the Brazilian urbanization trend is the large concentration of the population in large cities, nine areas are officially defined as metropolitan areas. The Southeast region sheltered three of them, São Paulo, Rio de Janeiro and Belo Horizonte. Three are located in the Northeast region, Recife, Fortaleza and Salvador; two in the South, Curitiba and Porto Alegre; and one in the North, Belém. They accounted for 28.9% of the total Brazilian population in 1991.

2.5-GOVERNMENT POPULATION POLICIES[158]

This section describes the shifts in the social actors' postures and strategies in the reproductive domain. The Brazilian government has never adopted population targets or a national population control policy. Only recently has it become tentatively involved in family planning activities. However, before public statements in favour of family planning actions in 1974, the Government tolerated the presence of private family planning agencies. The Brazilian Association for the Welfare of the Family (BEMFAM) with financial backing from the International Planned Parenthood Federation (IPPF) and other foreign sources has actively promoted family planning in Brazil since its founding in 1965. In addition to lobbying and publicity efforts, the organization signed contracts with state Governments to make contraceptives available through a community based system.

[158] This section is heavily based on Wood and Carvalho (1988), pp 160-3 and Martine (1995), pp 10-1.

It operates basically in five Northeastern states, Pernambuco, Rio Grande do Norte, Paraíba, Alagoas and Piauí.[159] However, this action has been very limited and has covered only a small proportion of the population.

The Brazilian official position was pronatalist until the 1974 Bucharest Conference. National security and the desire to colonize frontier regions were among the factors that explained official reluctance to endorse any policy that seemed to threaten population growth. The pronatalist position was also compatible with the doctrines of the Catholic Church. The Church has been important in national policy-making but less so among the population. Although it has officially been opposed to artificial methods of birth control, this position has became less rigid since the last decade, especially at the level of individual counseling by the clergy.[160]

At the 1974 Bucharest Conference, for the first time, the Government admitted that couples were free to plan their families and thus had a right to family planning information and techniques. Nevertheless, most of the main speech stressed that family planning could not substitute poverty-alleviation efforts and also emphasized its view against foreign intervention. The first governmental concern with Brazilian high population growth was expressed in 1978. However, the first actions only came one year later.

All governmental efforts in family planning matters are concentrated in the Health Ministry. From 1978 to 1983 the timid attempts at translating into effective action the principles outlined at the Bucharest Conference were frustrated. The first effort was made in 1978 and aimed at the prevention of high risk pregnancies. This met with opposition from the Church as well as from both right and left wing political thought and the feminist movement. Further efforts were made in 1979 and the early 1980s but were also frustrated. States and municipalities initiated local level programs especially in the Northeast at this time. These were helped in financial and administrative matters by non governmental organizations such as BEMFAM and UNFPA (United Nations Found for Population Activities). In 1983 the national Government resumed its efforts in

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[159] See: Wood and Carvalho (1988), p 162.

[160] A further discussion about the Church position will be done in Chapter 7.

reproductive health activities through the PAISM, a program of integrated health care for women. By this time, reproductive rights had won a prominent place in the feminist agenda. In 1986, the first genuine program in the reproductive health domain was finally launched by the Ministry of Health. However, this initiative encountered serious administrative and financial problems. Although the main problem is no longer political, the prolonged economic crisis and the scarcity of resources for social programs combined with the bureaucratic difficulties of the sector have not helped to generate momentum for the integrated health program. In 1988, only 7% of the Ministry of Health's 1,797 units were actually carrying out family planning activities.[161]

2.6-THE THREE AREAS OF STUDY

2.6.1 A Brief View

As already mentioned, the main objective of this thesis is to do an empirical analysis of three different Brazilian socio-economic regions. They are the states of Rio de Janeiro and São Paulo and the Northeast region composed of nine states. Although the former two states are both located in the Southeast region there are marked differences in their socio-economic conditions and demographic behaviour. These differences are rooted in colonial times and the Brazilian industrialization has lessened but not eliminated them.

The first region in size (18% of the Brazilian land), population (29% of Brazilian population in 1991) and the earliest in colonization is the Northeast. About 42.5 million people lived there in 1991, 39.4% in rural areas.[162] It is the poorest region of the country; its per capita income was about one third that of São Paulo in 1985. Its contribution to Brazilian GNP was 12.9% and to the national industrial output, 12.1%, in the same year. Northeastern agriculture, which still employed 45.5% of the Brazilian agricultural workforce, contributed only with 19.1% of the national agriculture product as a result of poor soils, low technology and severe droughts that often affect this area.

[161] See Barroso (1989), p 19.

[162] All the information about population presented in this section was extracted from the 1991 Demographic Census. The economic indicators were obtained from the IBGE (1986), pp 1001-3.

At the other extreme in terms of socio-economic situation, is the state of São Paulo, the second study area. It has the most modern and developed economy in Latin America. In 1985 it accounted for 34% of the Brazilian GNP and 43.9% of the national industrial output. According to the 1991 Demographic Census, its population was 31.5 million of whom 92.8% lived in urban areas occupying 2.9% of the total Brazilian land area. It contains the largest city in South America (São Paulo city) with 9.6 million inhabitants and it has been the principal migration attraction center.

The third area considered in this analysis is Rio de Janeiro state. Although it was the principal Brazilian industrial center in the nineteenth earlier and early twentieth century, its importance is rather due to having the most important administrative and cultural center of the country until the 1960s (Rio de Janeiro city). When Brazil became the seat of the Portuguese Empire, during the Napoleonic wars, Rio de Janeiro city was the capital. It was also the capital of the Brazilian Emperor and after 1891 the Brazilian Republic until 1961. Nowadays, the state has lost much of its economic and demographic importance. From 1938 to 1985, its contribution to the Brazilian GNP declined from 20.9% to 12.8%. Its population has been growing at a low pace due to having the country's lowest fertility rate and low in-migration. It was about 12.8 million inhabitants in 1991, 95.3% were in urban areas. It accounts for 0.5% of the Brazilian land and is still a very important cultural, tourist and leisure center.

2.6.2 Economic Differences

As outlined in previous sections, at the beginning of this century coffee exportation brought about conditions for an incipient industrialization in São Paulo. The creation of a manufacturing sector in this area soon took on a momentum of its own. This economy grew rapidly while the Northeast region and even Rio lagged behind. Governmental attempts to counteract differences between the Northeast and the Southeast were made. The most important was the creation of the Superintendency for the Development of the Northeast (SUDENE) which sought to redirect investment by reducing the relative cost of locating industries in the Northeast. These actions resulted in some industrial growth in that area but the effect on the regional inequalities was not clear.

Table 2.10 presents the proportion of the Brazilian total domestic product generated in each area by the proportion of the population living in that area during 1938-85 in order to show the variation of the regional position through the period.

Table 2.10
RATIOS BETWEEN THE PROPORTION OF BRAZIL'S DOMESTIC INCOME GENERATED IN A REGION AND THE PROPORTION OF THE BRAZILIAN POPULATION LIVING IN THE REGION
Brazilian Regions

Time Period	Rio de Janeiro	São Paulo	Northeast
1938(1)	2.4	1.8	0.5
1950(1)	2.1	2.0	0.4
1960(1)	1.8	1.9	0.5
1970(2)	1.5	1.8	0.5
1980(2)	1.4	1.8	0.4
1985(2)	1.4	1.6	0.5

Source: (1) Carvalho (1973), p 22
(2) Population data from several Censuses
Economic figures from IBGE (1986), p 1003

Rio de Janeiro and São Paulo had an economic position well above the Northeast throughout the whole period. However, Rio de Janeiro progressively lost its relative position. This area had the best economic performance until 1950. Since then its position was taken over by São Paulo. However, these indicators point to smaller differences between Rio and São Paulo's economic performance in 1985 than in 1938. The indices for the Northeast indicate an economic performance well below the average with slight fluctuations.

Table 2.11 shows for each region the evolution of each sector's share in the regional domestic income. As previously outlined, for the country as a whole there was a steady increase in the importance of the industrial sector. This started in 1950 and was also observed in all three regions along with a decline in the share of the agricultural sector. Nevertheless, this trend shows regional variation. For instance, in Rio de Janeiro agriculture did not played an important role in its economy during this century. From the 1930s to 1970 the service sector accounted for nearly 70% of regional income. This percentage declined after then and reached 60% in 1985. The share of industry increased from 24.2% to 38.4% over the period.

Table 2.11
SHARE OF EACH SECTOR IN THE REGIONAL DOMESTIC INCOME (%)
Brazilian Regions: 1938-85

REGIONS	1938	1950	1960	1970	1980	1985
Rio de Janeiro						
Agriculture	6.5	7.7	6.2	1.8	1.5	1.5
Industry	24.2	23.2	21.7	27.9	35.3	38.4
Services	69.3	69.1	72.1	70.1	63.1	60.1
São Paulo						
Agriculture	22.7	25.9	18.3	5.7	3.9	4.9
Industry	22.0	27.9	33.7	44.2	51.5	49.8
Services	55.3	46.3	48.0	50.3	44.7	45.7
Northeast						
Agriculture	39.8	42.9	41.9	22.3	16.7	15.9
Industry	13.5	11.8	11.5	18.1	32.1	35.4
Services	46.8	45.3	46.6	59.6	51.1	48.7

Source: Carvalho (1973), p 17 (until 1960)
IBGE (1986), pp 1041-4

In São Paulo in 1938 the share of the industrial output presented levels similar to Rio but agriculture was still accounting for 22.7% of its regional income. At that time, services were much more important in Rio de Janeiro than in this area. Industry participation rose substantially in São Paulo with the largest increase occurring in the 1960s. The Northeast economy was heavily based on agriculture until 1960. The governmental efforts made in the late 1950s and early 1960s seeking to stimulate its industry resulted in the proportional contribution of industry increasing from 11.5% in 1960 to 32.1% in 1980. Nevertheless, this was insufficient to offset the forces of regional divergence between this area and the two others as seen in Table 2.10. It was suggested by Merrick and Graham that despite the large battery of institutional and policy inducements to deal with regional inequality in the 1960s, more general economic policies apparently had a more pronounced and divergent regional impact to counteract the explicit regional policies in question.[163]

[163] See: Merrick and Graham (1979) p 145.

2.6.3 Long-term Trends in Population Growth

The economic cycles affected the population of the three areas in different ways as regards the pace of growth, regional distribution and ethnic composition. As seen in Table 2.8, the share of the Northeast population in the Brazilian total was steadily reduced from 46.7% to 28.9% between 1872 and 1991. A similar, though smaller, reduction also happened in Rio de Janeiro but with some fluctuations during 1940-70 (see Table 2.12). As will be seen later, internal migration was the most important determinant of that. By the same token, São Paulo's contribution to the national population increased dramatically, especially through 1872-1940.

Table 2.12
CONTRIBUTION OF THE THREE AREAS TO BRAZILIAN POPULATION (%)
1872-1991

AREAS	1872	1900	1940	1970	1991
Rio de Janeiro	10.6	10.0	8.8	9.6	8.7
São Paulo	8.8	13.1	17.4	19.1	21.5
Northeast	46.7	38.7	35.0	30.3	28.9

Source: Several Demographic Censuses

European immigration and interregional transfer of slaves were important determinants of the population redistribution during 1872-1940. After 1940, internal migration was the most important factor. Natural increase worked in opposite direction. It was higher in the Northeast than in the other two areas.[164] The first aspect analyzed here is the effect of African migration (slavery) on the pace of growth and ethnic composition of the population of the three areas. Table 2.13 shows the percentage of the slave population in the total population of these three areas in 1819 and 1872 and their growth rate.[165] It may be seen that slaves lost importance in São Paulo and the Northeast, especially in the latter area. In the Northeast this was a result of interregional migration. Large interregional transfer of slaves from the Northeast to the Southeast coffee regions took place in the 1860s and early 1870s. Rio and São Paulo gained with this transfer, both had positive

[164] See for instance: Carvalho (1973), p 147.

[165] Slavery was abolished on May 1888.

slave population growth rates. Nevertheless, the proportion of slaves in the São Paulo population declined as a result of a much larger increase of the free population. At that time, slave stocking was already declining in Brazil.[166] However, the slave population increased faster than the free one in Rio de Janeiro. This proportion rose from 28.6% to 32.3%.

Table 2.13
PERCENTAGE OF SLAVE POPULATION AND POPULATION GROWTH RATE (%)
Brazilian Regions: 1819-72

REGIONS	Slaves		Growth Rate		
	1819	1872	Slaves	Free	Total
Rio de Janeiro	28.6	32.3	1.60	1.28	1.38
São Paulo	32.6	18.7	1.31	2.72	2.38
Northeast	33.3	10.4	-0.33	2.45	1.89

Source: Ludwig (1985), p 54

The impact of slavery on the ethnic composition of the three areas was also differentiated. Table 2.14 compares the distribution of the population of the three areas by ethnic groups in 1940 and 1980. The black population was much more important in the Northeast than in the other regions. About 25% of the population there was black and less than 50% was white. The reverse can be observed for São Paulo, where 85% of the population declared themselves white and only 7.3% black. Asians had some importance only in São Paulo, accounting for 3% of the total population in 1940 (data not shown). The comparable distribution for 1980 points to a reduction in the importance of the black population in all regions, especially in the Northeast, and an increase in the proportion of mixed race. This whitening of the population is a demographic factor but also a political doctrine. In the first half of the twentieth century, white-black miscegenation was proposed as a natural solution to the race problem.[167] As a result, the mixed race population dominated the Northeast population in 1980. The contribution of the white population also declined in all regions probably as a result of differences in natural growth rates.

[166] See: Merrick and Graham (1979), p 65.

[167] See: Wood and Carvalho, p 141.

Table 2.14
DISTRIBUTION OF THE POPULATION ACCORDING TO ETHNIC GROUP (%)
Brazilian Regions: 1940-80

REGIONS	1940			1980		
	White	Mixed	Black	White	Mixed	Black
Rio de Janeiro	65.5	18.1	16.5	60.6	27.9	10.9
São Paulo	85.0	4.7	7.3	74.7	18.4	4.6
Northeast	48.1	27.0	24.8	26.8	65.8	6.7

Source: 1940 and 1980 Demographic Censuses

Another important component of the Brazilian population, especially in the early 20th century was European immigrants. This also varied according to region. Regional concentration is an important feature of Brazilian immigration with São Paulo the dominant state in the national pattern. Immigrants accounted for 18.1% of the São Paulo population, 5.0% of the Rio and 0.2% of the Northeastern population in 1920. Table 2.15 presents the distribution of the foreign population in 1920 according to nationality. In São Paulo, almost half of them were Italians and 20.1% Portuguese. Merrick and Graham pointed out that this area received 57% of the total Brazilian recorded immigration throughout 1889-1929. The inflow was constituted by whole families initially aiming to work in the coffee plantations.[168]

Table 2.15
IMMIGRATION COMPOSITION BY NATIONALITY (%)
Brazilian Regions: 1920

COUNTRY	Rio de Janeiro	São Paulo	Northeast
Portugal	69.4	20.1	35.6
Italy	11.0	48.1	10.9
Other Europeans	14.3	25.1	38.0
Other America	1.5	1.3	3.1
Asia	3.3	5.3	10.5
Other	0.6	0.2	1.9
Total	100.0	100.0	100.0

Source: 1920 Demographic Census

[168] See: Merrick and Graham (1979), pp 92 and 103.

Foreigners did not play an important role in Rio de Janeiro's population composition in 1920. They constituted only 5% of the population. However, before 1885 Portuguese immigration was quite important in this area. The inflow was strongly male dominated (single men) and played an important role in the early growth of factories and shops in Rio de Janeiro.[169] International migration was not important in the Northeast. Foreign migration decreased dramatically in Brazil from 1920 to 1980. International migration accounted for 2.1% and 0.2% of the São Paulo and Rio de Janeiro's populations, respectively. Significant figures for foreign living in the Northeast in 1980 was not found. Nevertheless, international migration was still more important in São Paulo than elsewhere.

As previously mentioned, since the 1930s internal migration replaced international inflows in importance. This is the third most important component of the regional population distribution. The long term trend in internal migration saw movements of people originated in the Northeast and directed to Rio de Janeiro and São Paulo. Table 2.16 presents estimates of net interregional migration rates for 1940-80. The estimates for Rio de Janeiro show high levels of positive migration during all four decades. However, a large decline was observed in the 1970s. Figures for São Paulo indicate that the positive net in-migration was very small during the 1940s. However, it increased considerably during the following decades, especially over the 1960s and 1970s. The Northeast has been traditionally an out-migration area. The highest rates were observed during the 1960s.

Table 2.16
TIME PERIOD TRENDS IN INTERREGIONAL NET MIGRATION RATES (%)
Brazilian Regions: 1940-80

REGIONS	1940-50	1950-60	1960-70	1970-80
Rio de Janeiro	6.5	9.9	13.0	5.8
São Paulo	2.5	7.6	9.2	13.9
Northeast	-8.7	-9.6	-8.4	-5.6

Source: Several Demographic Censuses

169 See: Merrick and Graham (1979), p 103.

Females predominated amongst the migrants of Rio and São Paulo in 1970 as well as in 1980 but this was more important in Rio de Janeiro than in São Paulo. The sex ratio was 0.83 and 0.85 in Rio in 1970 and 1980, respectively, and 0.95 and 0.89 in São Paulo in 1970 and 1980, respectively.[170] Figures 2.5 and 2.6 display the composition of the Rio and São Paulo inflows by region of origin for males and females, respectively, in 1970 and 1980. They refer to migrants that arrived in each area in the last ten years before the Census. Six regions are considered: the North, the Northeast, the other two states of the Southeast (Minas Gerais and Espírito Santo), São Paulo (when Rio is analyzed) or Rio de Janeiro (when São Paulo is considered) plus the South and the Central West. The Northeast was the most important source of migrants for both areas, for each sex and in both time periods. This importance increased dramatically in São Paulo during the 1970s (from 41.3% to 49.8% and from 37.8% to 46.9% for the male and female populations, respectively). In Rio, a slight increase was seen in the participation of the Northeast female immigrants from 38.9% to 42.3%. The second important origin area is formed by the states of Minas Gerais and Espírito Santo, mostly Minas Gerais. The importance of this area in the immigrant composition was larger in Rio de Janeiro except for the São Paulo male composition in 1970. The two areas share increased from 33.4% to 39.2% and from 38.9% to 42.3% for males and females, respectively. Migrants from the South played an important role in São Paulo. They contributed with about 15% of the total immigrants. This composition was not differentiated by sex.

[170] Data not shown.

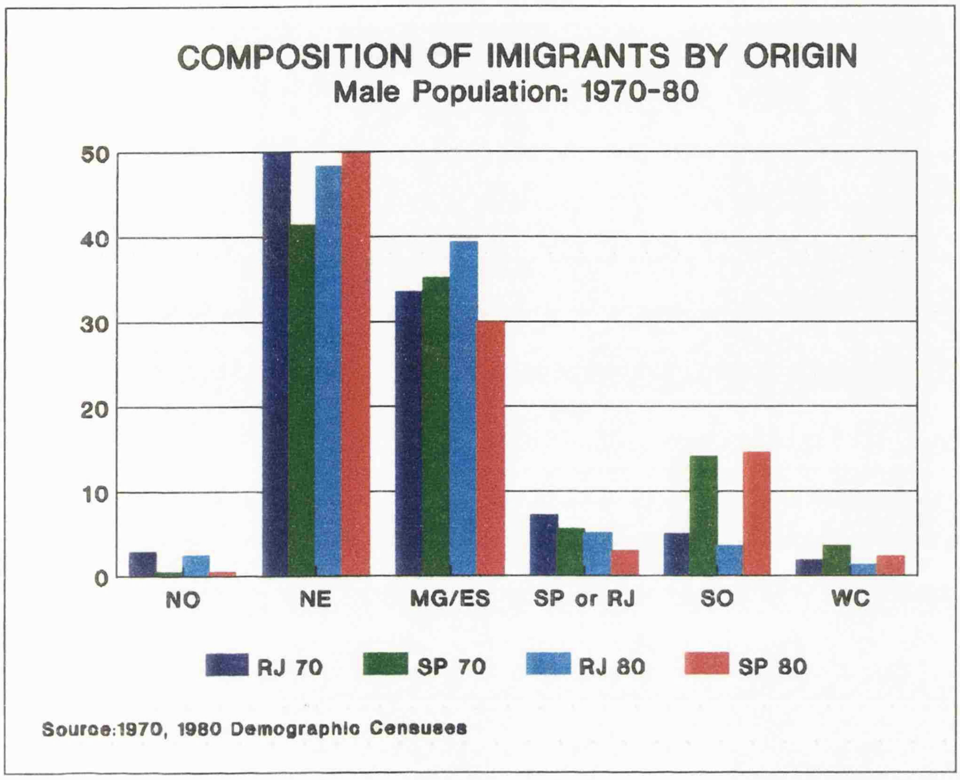

Figure 2.5

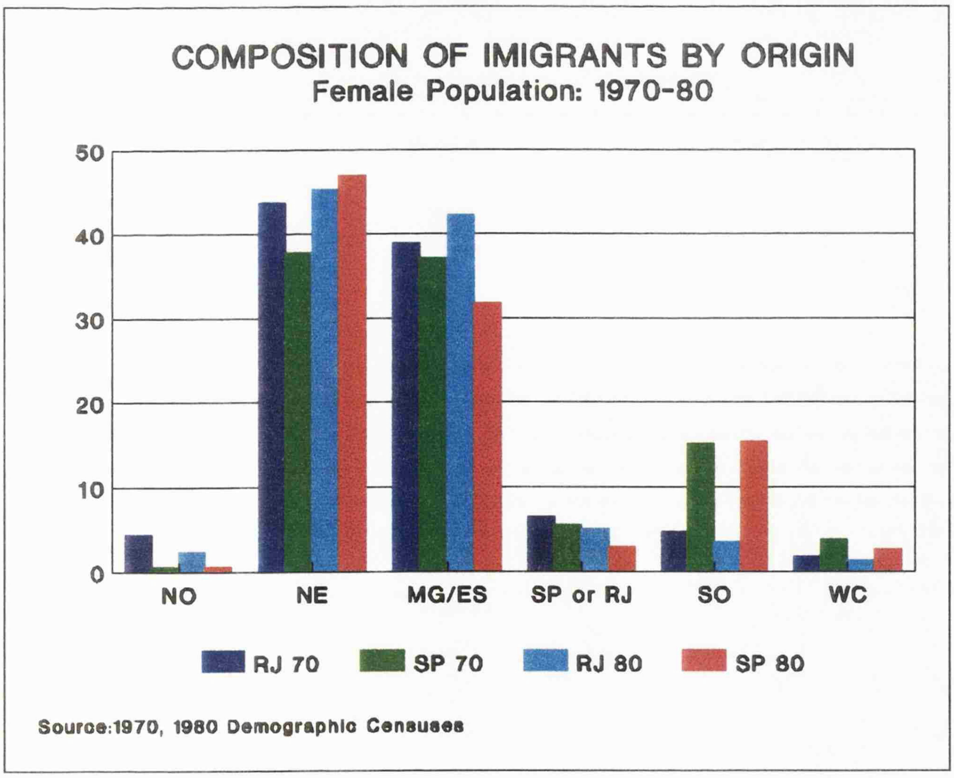

Figure 2.6

Another feature of the population redistribution is that produced by rural-urban movements. This has resulted in a dramatic increase in the percentage of the population living in urban areas in all regions. However, this phenomena has also been regionally differentiated. Table 2.17 presents the percentage the population living in the three areas from 1940 to 1991. Regional differences in the percentage of the urban population were very large in 1940 but they were narrowed strongly by 1991, especially between Rio and São Paulo. About 61% of the Rio de Janeiro population already lived in urban areas in 1940. Approximately 69.6% of the urban population lived in Rio de Janeiro city, the national capital, at that time. The share of Rio city in the state urban population declined over the period as a result of higher growth rates in the other urban centers (see Table 2.18). In 1991, this city alone accounted for 44.9% of Rio's urban population. Rio city's lower growth rates might be partially explained by the transference of the Brazilian national capital to Brasília in the Central West region in 1961. Nevertheless, this does not seem to have greatly affected the growth of the urban population of the State as a whole as the 1960s saw one of the largest increases in the percentage of urban population. The other large increase took place in the 1940s. The percentage of the state urban population increased from 61.1% in 1940 to 95.3% in 1991.

Table 2.17
PERCENTAGE OF POPULATION LIVING IN URBAN AREAS BY TIME PERIOD
Brazilian Regions

REGIONS	1940	1950	1960	1970	1980	1991
Rio de Janeiro	61.1	72.6	78.9	87.9	91.8	95.3
São Paulo	44.1	52.6	62.6	80.8	88.6	92.8
Northeast	23.4	26.4	33.9	41.8	50.5	60.6

Source: Several Demographic Censuses

Table 2.18
PERCENTAGE OF THE URBAN POPULATION LIVING IN THE STATE CAPITALS BY TIME PERIOD
Brazilian Regions

REGIONS	1940	1950	1960	1970	1980	1991
Rio de Janeiro						
Capital	69.6	70.6	62.5	53.8	49.1	44.9
Other	30.4	29.4	37.5	46.2	50.9	55.1
São Paulo						
Capital	40.0	42.7	41.1	41.6	38.3	32.8
Other	60.0	57.3	58.9	58.4	61.7	67.2
Northeast						
Capital	32.9	36.2	37.1	37.0	35.7	33.2
Other	67.1	63.8	62.9	63.0	64.3	66.8

Source: Several Demographic Censuses

With regard to the state of São Paulo the increase in the percentage of the urban population was even more dramatic than that observed in Rio de Janeiro. This percentage jumped out from 44.1% to 92.8% (see Table 2.17). The largest increase took place during the 1960s. The São Paulo city became the largest city in the country in 1960. The Northeast urbanization pattern has been quite different from the two other areas. It started later and has been slower. In 1940, 23.4% of the population lived in urban areas. Although this percentage increased dramatically through the period, only in 1980 did the urban population exceed the rural one. The proportion of the Northeast population living in urban areas in 1991 (60.6%) was 36% below of that reached by Rio de Janeiro at the same time. Another difference is related to the importance of the population of the large cities. For instance, the state capitals are also the largest cities in the region. Nevertheless, its share in the urban population was smaller than that observed in Rio de Janeiro and in São Paulo until 1980 (see Table 2.18). This means that the urban population was more evenly distributed among cities of different sizes than in the other areas. According to Martine et al, the Northeast region was the only one among the five major regions to show an increase in the proportion of the population living in towns with less than 20 thousand inhabitants, during 1940-80.[171]

[171] See: Martine et al (1990), p 116.

2.6.4 Regional Differences in Social Conditions

Although São Paulo took over the position of being the major Brazilian state in terms of economic development, the social indicators displayed in the following tables portray Rio de Janeiro as presenting the best social conditions in past time and even in the more recent period among the three areas. This is certainly an inheritance from the time when Rio was the country's capital that has been preserved until now. This is particularly true for education and the cultural situation. Table 2.19 shows some social indicators for the three areas in the early 20th century (1907) with illiteracy rates referring to 1920. Rio exhibited the lowest illiteracy rates for both sexes and the highest proportion of the population with primary and secondary schooling. The number of library books per capita was five times larger in Rio than in São Paulo and 11 times larger than that observed in the Northeast. The health services indicator also point to a more favorable situation for Rio de Janeiro.

Table 2.19
SOME SOCIAL INDICATORS FOR THE EARLY TWENTIETH CENTURY
Brazilian Regions

INDICATORS	Rio de Janeiro	São Paulo	Northeast
Proportion of the population aged over 15 years illiterate(1)			
Male	40.7	49.7	69.6
Female	55.6	68.1	80.7
Proportion of the population who finished school(1)			
Primary	41.4	34.0	20.4
Secondary	3.3	1.7	0.9
Cultural Life (Per 1,000 inhabitants)(2)			
Books	381.6	73.7	33.7
Health (Per 1,000 inhabitants)(2)			
Hospital Rooms	0.4	0.3	0.03

Source: (1) 1920 Demographic Census
(2) IBGE, (1939/40), pp 96, 108-9, 114

Socio-economic conditions changed over time in all regions but the relative advantage of Rio de Janeiro was maintained in most aspects. Table 2.20 displays some time period measures of welfare for 1940-80. They refer to education and health conditions. These conditions improved considerably as a result of social policies. Nevertheless, as differences between regions were large at the beginning and the policies were not more favorable to the Northeast in relation to the others, the relative position of the three areas was not significantly modified. Literacy increased significantly through the period in all regions. Nevertheless, about 46.4% of the Northeast population was still illiterate in 1980. The comparable percentage for Rio and São Paulo was about 13%. During the 1970s, literacy rates increased more in São Paulo than in Rio de Janeiro and the two rates equalized. A dramatic increase was also observed in the percentage of highly educated women in all regions. Rio de Janeiro still had the highest percentage (3.4%) followed by São Paulo (2.9%) in 1980. The Northeast percentage (1.4%) was less than half than that of Rio de Janeiro.

Table 2.20
TIME PERIOD MEASURES OF WELFARE
Brazilian Regions

MEASURES	1940	1950	1970	1980
Average Literacy Rates % (Population aged 10 years and over)				
Rio de Janeiro	67.9	73.1	84.9	87.1
São Paulo	57.7	64.0	83.2	87.0
Northeast	24.4	30.2	49.5	53.6
% Women Aged 10 years and over with University Degree				
Rio de Janeiro	0.2	0.8	2.9	3.4
São Paulo	0.1	0.5	1.4	2.9
Northeast	NS	0.02	0.2	1.4
Health Personnel (Per 1.000 inhabitants)(1)				
Rio de Janeiro				3.4
São Paulo				1.7
Northeast				1.0
Infant Mortality (Per 1000)(2)				
Rio de Janeiro	146.9	124.0	98.7	75.6
São Paulo	154.7	128.1	94.2	74.7
Northeast	178.7	176.3	151.2	121.4
Expectancy of Life at Birth(2)				
Rio de Janeiro	45.4	50.9	57.3	63.2
São Paulo	43.6	46.8	58.5	63.6
Northeast	38.2	38.7	44.4	51.6

Source: Several Demographic Censuses
(1) IBGE (1988), pp 82-3
NS = Not Significant

Health conditions measured by infant mortality rates and expectancy of life at birth, also shown in Table 2.20, point to slightly better health conditions in Rio de Janeiro than in São Paulo in 1940. Infant mortality was very much reduced during 1940-80 in both areas which resulted in large increases in the expectancy of life at birth. These changes were more marked in São Paulo than in Rio de Janeiro and slightly altered the relative position of the two areas. Nevertheless, the relation of health personnel to population was still favorable to Rio de Janeiro. Although changes also took place in the Northeast, the differential between this area and the two other increased over the period. Expectation of life was 12 years lower there than in São Paulo.

Another important regional difference that could have affected fertility behaviour is the participation of the population in the labour market. This is especially true for females and the adolescent population. Refined activity rates and activity rates for the population aged 10-14 in 1980 by sex are displayed in Table 2.21. Although Rio women were more highly educated than those in São Paulo, the latter region had a higher female activity rate. The largest difference is found among the adolescent group. About 10.5% of female adolescents in São Paulo were engaged in economic activity while in Rio the comparable percentage was 4.2%. The male adolescent activity rate was also much higher in São Paulo than in Rio. This suggests the existence of less skilled jobs in São Paulo. The higher proportion of workers who contributed to social security in Rio reinforces this. Nevertheless, workers there seem better paid than in Rio, considering the lower proportion of the economically active population who received less than one minimum wage. Again, the figures for the Northeast portray higher poverty there. The main indicators are: lower female participation, a high adolescent activity rate, especially for the male population, a higher proportion of the economically active population earning less than one minimum wage, especially for females. The high proportion of female workers receiving less than a minimum wage in all areas reflects the importance of domestic servants among the female employment.

Table 2.21
ACTIVITY RATES FOR FEMALE AND ADOLESCENT POPULATION
Brazilian Regions: 1980

RATES	Rio de Janeiro		São Paulo		Northeast	
	Male	Female	Male	Female	Male	Female
Refined Rate	68.2	30.0	75.7	32.6	71.3	23.8
Adolescent Rate	7.3	4.2	16.4	10.5	25.6	8.7
% < Min Wage[(1)]	15.9	37.9	13.6	35.2	8.5	76.7
% Social Security[(1)]	79.6	69.7	75.9	68.6	9.7	37.7

Source: 1980 Demographic Census
Note: [(1)] % of the population in relation to the economically active population

2.6.5 Regional Differences in Cultural Values

Apart from the socio-economic regional differences shown previously, the three areas exhibit some other important differences in terms of culture, values and religiosity. Table 2.22 displays some indicators which stress these differences. They refer to the more recent period and portray Rio de Janeiro as the most modern society among the three areas. Women living there were more educated considering the mean number of schooling years and the proportion with university degrees. Apart from being more educated they also presented the highest percentage of newspaper readers. Rio de Janeiro had the highest ratio of daily newspapers and library books per thousand inhabitants. Women were more secularized measured by a lower proportion of church goers. The percentage of divorced women was higher there. Education indicators in São Paulo are about the same as in Rio but those related to cultural habits like newspaper readership or library volumes were lower than in Rio. Also, São Paulo had the highest percentage of religious women among the three areas. This added to the relatively lower percentage of divorced women suggest that this is a more conservative society, although the richest among the three. On the other hand, all the indicators shown in this chapter confirm the Northeast as a poor and conservative society.

Table 2.22
SOME INDICATORS OF CULTURAL VALUES
Brazilian Regions

INDICATORS	Rio de Janeiro	São Paulo	Northeast
% Divorced Women(1)	5.5	4.2	3.6
% Women with University Degree(1)	9.9	9.0	2.2
Mean Number School Years(1)	4.2	4.1	3.4
% Women Goes to Church(1)	31.0	41.7	36.8
% Women Watch Television(1)	90.0	90.1	58.5
% Women Read Newspaper(1)	65.1	55.1	38.1
Daily Newspaper (Per 1,000 People)	3.3(2)	1.7(2)	0.3(3)
Library Volumes(Per 1,000 People)	53.1(2)	35.3(2)	9.8 (3)

Source: (1) 1986 DHS (All information refer to women aged 15-44)
(2) IBGE (1984), pp 139-40
(3) IBGE, (1983), p 287

2.6.6 Summary

It is clear that these three areas are quite different in economic, social and cultural aspects. These differences are rooted in colonial times and have persisted. Among the three areas, the Northeast was the first one to be settled. Its development was based on sugar cane export and brought some prosperity to this region. However, this prosperity did not last. The sugar economy went to stagnation during the eighteenth century and it became endemic to the Northeast. This left deep marks in this society namely extreme poverty, land concentration, a high proportion of population living in rural areas and illiteracy, among others.

The second area in settlement was Rio de Janeiro. Its economic importance came first with coffee plantations but in the late eighteenth century Rio city became the capital of the Portuguese Empire. From then until 1961 it was the national capital. These two facts combined with some industrial development resulted in that this area had economic dominance in Brazil until about 1960. The impact of this, especially from the time that Rio city was capital, are still present in the society. Although it is not the richest area any more, it has kept this advantageous position in terms of education, culture and especially modern values.

The more successful coffee culture in São Paulo meant that this area easily took over the first position in terms of economic development. The city of São Paulo is nowadays the largest city in Latin America. Social conditions have improved dramatically there but the society is still less culturally dynamic than Rio society. It is also more conservative in familial and religious aspects.

As will be seen in the following chapters, fertility's movements have been quite different in these three areas. This is expected and led to their selection for the study of the Brazilian fertility transition. They represent very well the Brazilian population and economy as they accounted for 69.5% of its population and 60.5% of the GNP. They also portray the differences in Brazilian society which are huge. Hence, it is expected that a comprehensive analysis of their fertility trends provides grounds not only for the understanding of the Brazilian fertility transition as a whole but for a more general understanding of the reproduction process.

Chapter 3

FERTILITY PATTERNS: A long term view

3.1-INTRODUCTION

This chapter seeks to describe the principal fertility trends and patterns of family formation in the three Brazilian areas previously outlined. As they have experienced different socio-economic history, it is expected that this has affected their fertility trends. The purpose is to find common points and differences in these trends. It is based mainly on the Brazilian Demographic Censuses from 1940 to 1980 and on the Demographic and Health Survey (DHS) undertaken in Brazil in 1986.

As mentioned before the effort to understand historical fertility trends in Brazil encounters the difficulty of scarcity, defectiveness and comparability of information. As the first fertility questions were only introduced in the 1940 census, little is known about fertility trends in Brazil before the 1930s. Another problem results from the fact that censuses are decennial. The period measures of fertility levels that can be estimated using P/F ratios reflect, roughly, average fertility levels of either the quinquennium before the census or of the whole decade. As averages, they do not indicate the fluctuations that happened within the period.[172] A further obstacle is the failure to distinguish live and stillborn children in the 1950 and the 1960 censuses. The only information gathered was the total number of births, live and still, by women in their reproductive period.

[172] Attempts at estimating measures of fertility for quinquennia were made by Fernandez and Carvalho (1986). They calculated total fertility rates for the quinquennia between 1960-1980, applying the own child method to the 1980 census data for Brazil as a whole. Frias and Oliveira (1990, 1991) developed a model to estimate fertility levels and age-patterns of fertility for the first quinquennium of the decades before the census. They calculated these measures for the five major geographic regions for the quinquennia between 1930-1980.

Consequently, the history described here starts with the reproductive behaviour of women born 1880-90 and who probably experienced most of their reproductive life in the second decade of this century and finishes with the fertility experience of the first half of the 1980s. Unfortunately, the fertility measures used here are neither closely related to the stages of each regional demographic transition nor to the period of each economic cycle as suggested by the classical theory. The data simply do not allow such an approach.

As outlined in Chapter 1, there are many estimates of period total fertility rates as well as age-specific fertility rates published for regions, states and/or by socio-economic groups. As the thesis's interest is in having historical series for the three regions and analyzed by socio-economic variables, it was decided to calculate new estimates for the considered period searching for comparability and consistency. Two sets of fertility estimates are calculated based on census data: synthetic cohort rates based on the Brass method[173] and period total fertility rates based on the methodology of Frias and Oliveira.[174] As previously mentioned, questions which allow the measurement of current fertility such as the number of children born during the 12 months preceding the census, were first introduced in the 1970 census. To overcome the lack of this kind of information, Carvalho (1973), Mortara (1956), Frias and Oliveira (1990) and Santos (1990) developed different models to estimate total fertility rates. The choice of the Frias and Oliveira method is due to the fact that this also provides tools for the estimation of the proportion of stillbirths and age-specific fertility rates for the whole period. The fertility rates based on DHS data are calculated using the P/F ratio method.[175]

The chapter is divided into seven sections, including this introduction. The next section presents a brief summary of fertility trends before 1930. Section 3 considers the cohort total fertility trends and regional differentials. Section 4 analyzes period fertility

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[173] See Brass (1985), pp 69-70.

[174] See Frias and Oliveira (1991), pp 82-4.

[175] See United Nations, (1983) pp 31-6.

movements by age groups and estimates trends in the degree of fertility control. Section 5 delineates changes in patterns of family formation and section 6 is an attempt at measuring the impact of childhood mortality on fertility trends. A summary of the principal findings is given in section 7.

3.2-THE ERA OF UNCERTAINTY

3.2.1 What Is Known?

In general, Brazilian demographic studies have singled out the 1930s as the starting point of Brazil's demographic history not because this marks a transition of any kind, but because it is not until this time that data became available. The period before 1940 has been described by Brazilian demographers as "the uncertain phase" of demographic estimates.[176] Attempts at estimating fertility measures for this period have been made by Bulhões de Carvalho (1928), Mortara (1940, 1967), Frias and Carvalho (1992, 1994), among others. Many of these estimates refer only to Brazil as a whole. They indicate high values for fertility in 1900-1940 and large regional differences. Bulhões de Carvalho as well as Mortara calculated crude birth rates for the Brazilian states. Bulhões de Carvalho's figures are based on the 1920 census data and vital registration. The incompleteness of the vital statistics resulted in very low estimates.[177] Mortara's measures are based only on census data, children by age. They refer to specific times before the census: one, three and 6-10 years. They are shown in Table 3.1. The figures for the Northeast and Rio de Janeiro are weighted averages of the figures for the states which made up those regions at that time.

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[176] See Goldani (1978), p 318.

[177] See Bulhões de Carvalho (1928), p LIV.

Table 3.1
CRUDE BIRTH RATE BY YEARS BEFORE THE 1920 CENSUS
(Per 1000)
Brazilian Regions

Regions	1 YEAR	3 YEARS	6-10 YEARS
Rio de Janeiro[1]	29.9	38.9	39.9
São Paulo	34.4	46.7	50.9
Northeast[1]	26.8	43.8	51.6

Source: Mortara (1940), p 241
Note: [1] Weighted average of figures for component areas

Mortara himself recognized that the population aged less than one year was undercounted and hence very recent fertility underestimated. This problem affected the population of the Northeast much more than those of Rio and São Paulo. Excluding the estimates based on this information, the data seem to indicate large differences between Rio's fertility and the two other regions. Women in Rio showed the lowest birth rate among the three areas. The estimates also pointed to some fertility decline between 6-10 years before the survey and three years before, though less for Rio.

3.2.2 Some Fertility Estimates

This sub section presents some analysis based on census data for women aged 40-49 and 50-59. Before starting, it is important to stress the difficulties in analysing these data. The first one is a consequence of women's age. As they originate from older women, they might exhibit memory errors. It is frequently suggested that old women forget to report dead children. The second difficulty arises because analyzed women are those who had survived to the time of the census. It is impossible to know if women who had died had the same fertility levels as surviving women. Also, cohort comparisons might be affected by migration, though down to the 1940s, internal migration was not important in Brazil. The first two problems would be more accentuated in the Northeast than in the two other areas which would tend to lead to the Northeastern fertility being underestimated. On the other hand, as migration has mainly been from the Northeast to the two other areas, this would bring fertility up in all areas. So, the difficulties referred to would, if anything, lead to underestimation of the regional fertility differentials.

An attempt at measuring fertility early in the century is made through cohort fertility rates, considering the reproductive experience of women aged 50-59 years at the 1940 and the 1950 Censuses. As these women were born 1880-90 and 1890-1900, respectively, their experience roughly reflects fertility levels in the 1920s and 1930s, respectively. The results are displayed in Table 3.2. They confirm Rio de Janeiro's lower fertility compared with the other areas and suggest a slight increase in fertility there in the more recent cohort. Sao Paulo experienced higher fertility than other areas in the first period and then showed some decline. Northeast women experienced a substantial fertility increase between the two cohorts and came to present the highest fertility among the three areas. The differentials between Rio and São Paulo were reduced, between Rio and the Northeast enlarged and between the Northeast and São Paulo reversed.

Table 3.2
COHORT TOTAL FERTILITY RATES:
Women aged 50-59
Brazilian Regions

Regions	Birth Cohorts 1880-1890	1890-1900
Rio de Janeiro	4.6	4.9
São Paulo	6.0	5.5
Northeast	5.4	6.6

Source: 1940 and 1950 Demographic Censuses

3.2.3 Patterns of Family Formation

The regional patterns of family formation are analyzed through parity progression ratios and mean ages at first birth. As parity progression ratios indicate the proportion of women with at least *n* children who go on to have at least one more child, they are considered a good indicator of the existence (or not) of parity-related fertility control. In others words, they intend to indicate the stage of fertility transition. Figure 3.1 displays parity progression ratios for women aged 50-59 at the 1940 Census, called BC1 in the figure, and at the 1950 Census, called BC2, for the three Brazilian regions. Among the first birth cohort, the data suggests absence of parity dependent fertility control. Women in Rio de Janeiro showed the lowest parity progression ratios among all regions but the range of variation among them was not marked (from 0.900 to 0.754) considering that it means the entire variation among the parity progression ratios from the progression to the second up to the progression to ten or more children. Fewer women started childbearing there. Northeast and São Paulo's parity progression ratios of the first birth cohort behaved in a very similar way, except for the progression to the first birth. This was higher in São Paulo.

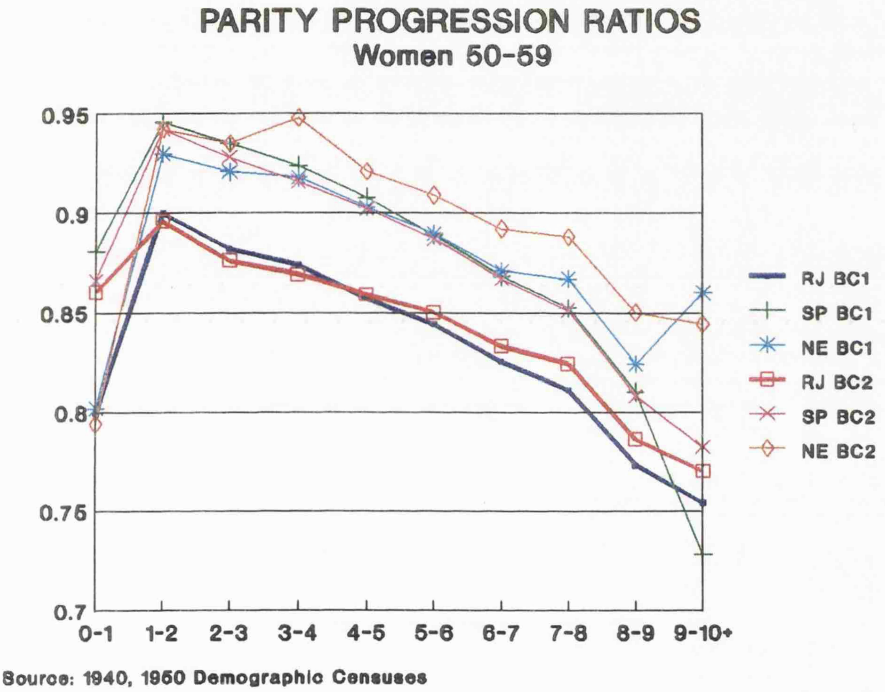

Figure 3.1

The proportions of childless women were quite high, especially in Rio de Janeiro. This may suggest some reporting errors as some failure of enumerator to make entries of women with zero child. These might had been grouped with women who did not answer this question. Also, the high proportions may indicate lower nuptiality in Rio for instance, as it will be seen in Chapter 4 and a result of higher infertility. Variations in the parity progression ratios across the two birth cohorts can also be seen in Figure 3.1. So far as Rio is concerned, an increase is observed in the proportion of women who had a first birth and in other parity progression ratios which contributed to the fertility increase. There is no clear indication of parity-related control in these data. The variation among the whole range of parity progression ratios was still relatively narrow, from 0.916 to 0.770. However, parity progression ratios were much lower there than in São Paulo and the Northeast.

In the Northeast, parity progression ratios for orders higher than four increased between the two cohorts and this explains the rise in fertility previously seen (see Figure 3.1). The percentage of childless women was approximately stable and was the lowest among all regions. In the case of São Paulo, apart from a slight reduction in the proportion of women who had a first birth, there are no indications of changes in parity progression ratios (see Figure 3.1). Summarizing, there are no signs of parity-related fertility control in either birth cohorts for any region at the beginning of the century. However, the values of parity progression ratios were much lower in Rio than in the two other areas.

The onset of the family formation process is observed through the mean age at first birth. The 1940 census gathered information about age at first birth for women aged 12 years and over. Mean ages at first birth are calculated for the 1880-90 and 1890-1900 birth cohorts and are displayed in Table 3.3. The data point to a later start to childbearing in Rio de Janeiro and the Northeast and an earlier onset in São Paulo in both birth cohorts, the difference being about or slightly more than one year. This might explain the relatively lower fertility of Rio de Janeiro and the Northeast.

Table 3.3
MEAN AGE AT FIRST BIRTH:
Women aged 50-59 and 40-49
Brazilian Regions

	Birth Cohort	
Regions	1880-1890	1890-1900
Rio de Janeiro	23.5	22.9
São Paulo	22.4	21.9
Northeast	23.6	22.9

Source: 1940 Demographic Census

There was a reduction in the mean age at first birth between the 1880-90 and 1890-1900 birth cohorts in all regions.[178] This was slightly more marked in the Northeast (0.7 years) than in Rio de Janeiro and São Paulo which resulted in a diminishing of the regional differences from 1.2 to 1.0 years. It is expected that women who start childbearing earlier have higher fertility because they are exposed for a longer period and, moreover, they may be selected for being less prone to control their fertility. Table 3.4 displays the mean number of children ever born by duration since first birth for women aged 50-59 years from the birth cohort 1880-90. Duration less than ten years were excluded because they refer to women who started childbearing after age 50 which implies very few births. The means point to an increase in fertility with duration, as expected. Northeast women exhibited lower fertility than others up to duration of 15 years but higher fertility at longer duration. Rio de Janeiro women experienced lower fertility than women of other areas at duration over 15 years. Duration had regionally differentiated impact on fertility. Its effect is more marked in São Paulo and the Northeast. This can be measured by the range of variation of the mean number of children ever born according to duration. This ranged from 3.2 to 8.8 and from 2.9 to 9.1 children in São Paulo and the Northeast, respectively and from 3.3 to 7.6 children in Rio de Janeiro.

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[178] The comparison made is between women aged 50-59 years and 40-49 years at the 1940 census. Although, the later had not completed their reproductive experience at the census time, few women had their first birth when they were in their forties: 1.2%; 2.4% and 2.5% in Rio, São Paulo and the Northeast, respectively.

Table 3.4
MEAN PARITY BY DURATION SINCE THE FIRST BIRTH
Women aged 50-59
Brazilian Regions

Duration	Rio de Janeiro	São Paulo	Northeast
10-15	3.3	3.2	2.9
15-20	3.6	4.1	4.0
20-25	4.1	4.7	5.3
25-30	5.0	5.7	6.7
30-35	6.2	7.4	8.0
35-40	7.6	8.8	9.1

Source: 1940 Demographic Census

As seen in Table 3.2, cohort fertility rates increased between the two birth cohorts in Rio de Janeiro and the Northeast. This might be partially explained by the reduction in the mean age at first birth. In São Paulo, fertility declined in despite of a reduction in the mean age at first birth.

3.3-COHORT TOTAL FERTILITY TRENDS

An attempt at measuring cohort fertility rates using the Brass synthetic cohort technique applied to census data[179] is shown in Figure 3.2. The results refer to women born in quinquennia between 1890 and 1960. It may be seen that regional differences in fertility rates were large early in the century. At the start, birth cohort 1890-95, Rio women had on average 2.5 children less than those of São Paulo and the Northeast. Fertility then declined in Rio in five successive birth cohorts and São Paulo in six successive cohorts. The decline was faster in the latter area. Fertility stayed more or less constant in the Northeast.

[179] See Brass (1985), pp 69-70.

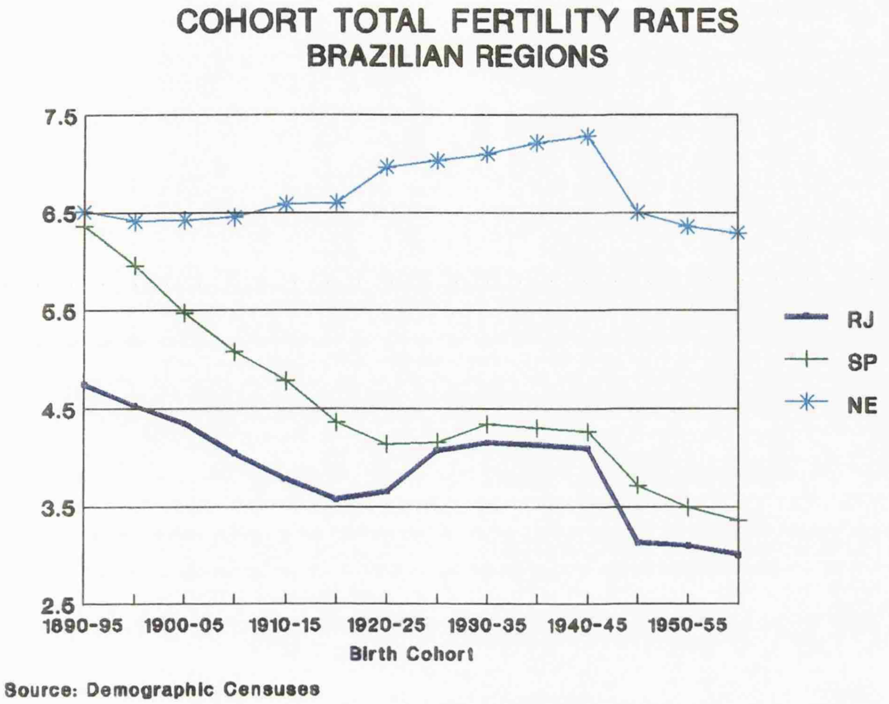


Figure 3.2

Figure 3.2 also shows that fertility rose after this decline in Rio and São Paulo and then declined afterwards. In Rio and the Northeast beginning with the 1920-25 birth cohort fertility rose somewhat and the same then happened in São Paulo beginning with the 1930-35 birth cohort. Fertility resumed its decline in all areas in the 1945-50 birth cohort. It may be seen that differentials increased when fertility declined and diminished when fertility rose. The long term trend was towards a widening of differentials. This was caused by the late onset of fertility transition in the Northeast paralleled with the acceleration of fertility decline in Rio and São Paulo in the more recent period.

3.4-PERIOD FERTILITY TRENDS

3.4.1 General Fertility Trends

Table 3.5 shows the total fertility rates for the first quinquennium of each decade between 1930 and 1990. The methodology of Frias and Oliveira[180] is used. These measures confirm previous suggestions that fertility was already lower in Rio de Janeiro by the 1930s. The Rio total fertility rate at 4.4 was 1.3 children lower than the São Paulo rate and 2.4 children lower than the Northeast rate in 1930-35. Since then fertility has declined dramatically in Rio de Janeiro and São Paulo. Rio de Janeiro's total fertility rate dropped from 4.4 in 1930-35 to 3.8 in the first half of the 1950s, then increased again to 4.4 over the next ten years before declining steadily, reaching 2.2 in the first quinquennium of the 1980s. In São Paulo, the total fertility rate declined from 5.7 to 4.1, then increased in the 1960s to 4.6. Fertility decline resumed in the 1970s and the total fertility rate reached 2.6 in the early 1980s.

Table 3.5
TOTAL FERTILITY RATES AND COEFFICIENTS OF VARIATION (CV) BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast	CV(%)
1930-35	4.4	5.7	6.7	29.6
1940-45	3.8	4.8	6.8	42.2
1950-55	3.8	4.1	7.2	46.3
1960-65	4.4	4.5	7.4	33.4
1970-75	3.3	3.7	6.3	51.4
1980-85	2.2	2.6	5.1	89.9

Source: Several Demographic Censuses and 1986 DHS

. Northeast women experienced an increase in their fertility from 1930-35 to 1960-65 and a fast decline since then (see Table 3.5). Their total fertility rate fell from 7.4 in the early 1960s to 5.1 in the early 1980s. It was reduced by 0.9 children from 1960-65 to 1970-75 and 1.2 children in the following decade. Nevertheless, in the early 1980s the rate in the Northeast was still more than twice that of Rio de Janeiro and only slightly lower than the 1930-35 São Paulo total fertility rate. The regional differentials in fertility

[180] See Frias and Oliveira (1991), pp 82-4.

are summarized by the coefficients of variation shown in Table 3.5. It is assumed that if fertility in all regions is converging to a low rate, this should be the Rio fertility rate. Thus, the coefficient is calculated as the ratio between the standard deviation and the Rio cohort fertility rate. It measures the deviation of Northeast and São Paulo fertility rates from Rio fertility. It may be seen that differentials increased when fertility declined and diminished when fertility rose. The long term trend was towards a widening of differentials. This seems to be a consequence of the relatively late fertility decline occurring in the Northeast and the acceleration of the decline in the two other areas in the more recent period.

3.4.2 Changes in the Age Pattern of Fertility

Figures 3.3, 3.4 and 3.5 show age-specific fertility rates for the three regions in turn for the first quinquennium of each decade from the 1930s to the 1980s. Considering the whole period, it may be seen that the fertility decline was substantial for all age.in groups in all regions. However, this decline was not homogeneous for all groups. It was mentioned before that the fertility decline occurred in two stages in Rio de Janeiro. The first decline that occurred in the 1930s was mainly generated by women aged 30-39 years (see Figure 3.3). Fertility of women aged 15-19 increased in this period. During the following decade, fertility of women aged 20-24 increased but its effect was counterbalanced by a reduction of fertility among older women. The fertility increase observed in the 1950s was mostly the result of the reproductive behaviour of women aged over 30 years. The second decline, initiated in the second half of the 1960s, was experienced by all women except those in their teens whose fertility increased in the later 1960s[181] and declined dramatically ten years later.

[181] The increase of Brazilian teen-age fertility in the 1970s is discussed by Badiani (1986); Barroso, Campos and Moraes (1986); Henriques and Valle (1988) and Melo (1993), among others.

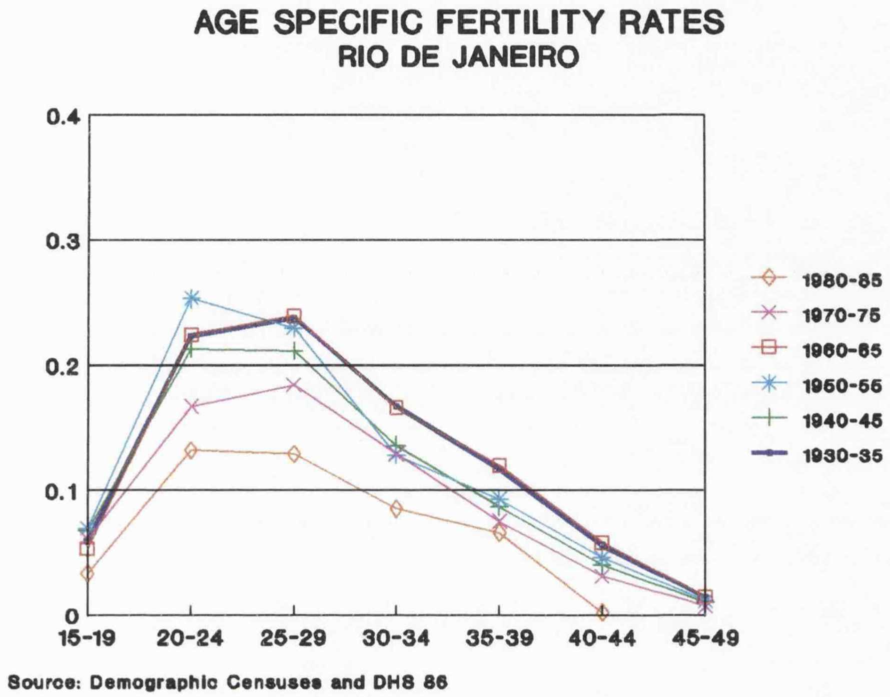


Figure 3.3

Teen age fertility in São Paulo behaved in almost the same way as in Rio de Janeiro (see Figure 3.4). The only difference was its reduction in the later period, 1980-85, which was much more marked in Rio de Janeiro. Fertility decline started in São Paulo in the 1930s mostly among women aged 30-39 as in Rio de Janeiro. Fertility of younger women, less than 25 years, increased in the early 1950s but the decline among older women was more noticeable and the total fertility rate decreased. In the early 1960s women aged 25 and over experienced an increase in their fertility as in Rio de Janeiro. Since the second half of the 1960s, fertility decline has been widespread among all age groups above 20 years, the oldest groups experiencing the largest decline.

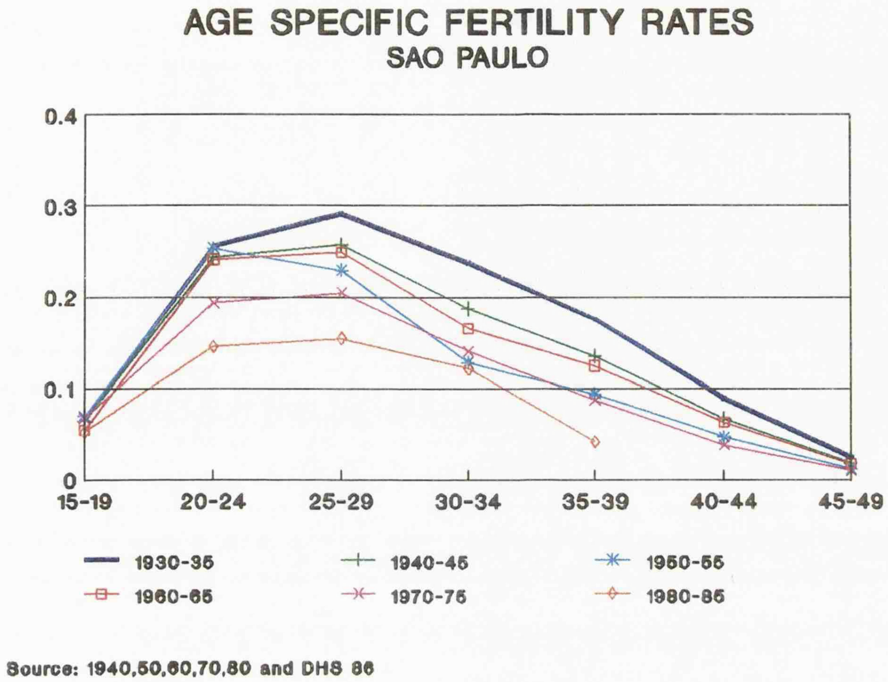
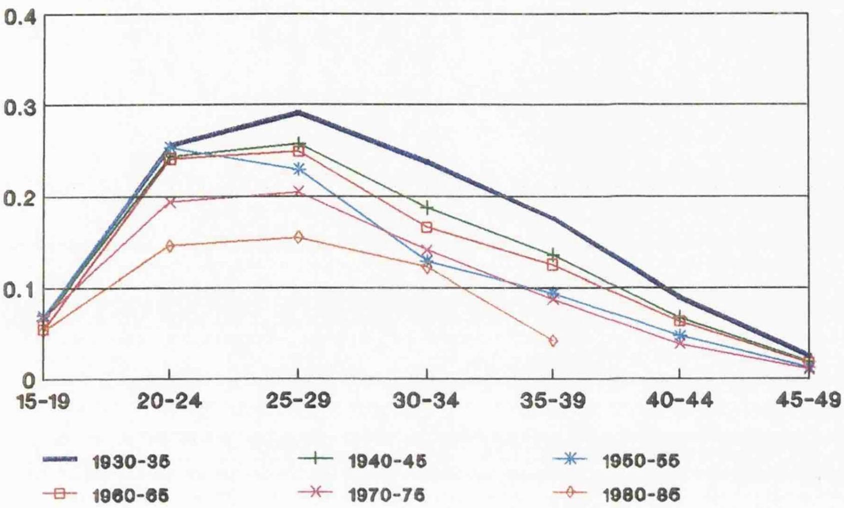


Figure 3.4

It is not possible to speak of a fertility decline in the Northeast before the 1970s (see Figure 3.5). The increase of fertility in the 1940s and 1950s was evenly distributed among the age-groups. However, as soon as fertility decline started there, it exhibited two characteristics: a dramatic decline in a very short period and most of the decline being produced by women aged 25-34 years. During the 1970s, fertility decline was mostly due to women aged over 30 years. In the following decade, it was the relatively younger women, 25-34 years, who were the main responsible for it. Teenage fertility increased in the 1930s, then was constant until the 1970s when it increased again.

AGE SPECIFIC FERTILITY RATES
SAO PAULO



Source: 1940,50,60,70,80 and DHS 86

Figure 3.5

3.4.3 The Control of Marital Fertility

As no comprehensive data on regional differences in use of contraception are available before 1986, an attempt is made to evaluate the degree of marital fertility control using other data. The age-specific fertility rates were translated into age-specific marital fertility rates by using data on marital status and measures of the degree of fertility control, developed by Coale and Trussell (1974), are estimated. In this thesis, married women were grouped with the single ones who had children in order to measure the proportion effectively married and to reduce the impact of the underreporting of consensual unions on the number of women exposed to the risk of childbearing. Although this grouping results in a reduction of the impact of misreporting, the bias is not quite eliminated. One bias is still left: women who were in informal unions but who had no children; they were exposed. This omission could bias the calculation of marital fertility rates, especially for younger women in the direction of higher fertility. On balance, this bias was judged to be preferable to other more serious problems. Marital age-specific fertility rates for 1986 were obtained directly from children ever born by married women.

Table 3.6 displays the ratios of the observed marital fertility to a natural fertility standard represented by data assembled by Coale and Trussell for the five-years age groups between 20 and 44 years and the indexes of fertility control, M and m. Both indexes are derived from the ratios of age-specific marital fertility rates to the mentioned standard. M is a measure of the maximum fertility experienced in the population under study, normally that of women aged 20-24, in relation to the average standard of the natural fertility. The m measures the degree of fertility control. It is a function of the intensity which observed fertility rates fall below the rates in the standard pattern.

Table 3.6
RATIOS OF OBSERVED MARITAL AGE-SPECIFIC FERTILITY RATES TO NATURAL STANDARD FERTILITY AND COALE-TRUSSELL'S INDEX[1]

Regions	1930	1940	1950	1960	1970	1980
Rio de Janeiro						
20-24	0.965	0.906	1.066	1.186	0.755	0.552
25-29	0.794	0.678	0.676	0.819	0.604	0.379
30-34	0.555	0.442	0.378	0.550	0.414	0.217
35-39	0.479	0.353	0.330	0.474	0.295	0.261
40-44	0.473	0.327	0.326	0.464	0.239	0.000
M	0.901	0.829	0.879	1.001	0.747	0.486
m	0.534	0.744	0.847	0.666	0.839	0.784
São Paulo						
20-24	0.920	0.922	0.972	1.114	0.780	0.751
25-29	0.847	0.757	0.663	0.777	0.614	0.333
30-34	0.711	0.580	0.388	0.508	0.425	0.341
35-39	0.646	0.492	0.343	0.459	0.318	0.142
40-44	0.656	0.486	0.339	0.459	0.273	0.000
M	0.895	0.865	0.827	0.980	0.751	0.664
m	0.262	0.473	0.761	0.631	0.766	1.103
Northeast						
20-24	1.175	1.135	1.341	1.354	1.140	0.809
25-29	1.069	1.064	1.177	1.203	1.070	0.742
30-34	0.928	0.858	0.988	1.049	0.956	0.567
35-39	0.818	0.769	0.932	0.986	0.829	0.587
40-44	0.908	0.800	1.999	1.042	0.821	0.521
M	1.126	1.109	1.256	1.280	1.136	0.795
m	0.216	0.284	0.225	0.198	0.254	0.349

Source: Several Demographic Censuses and 1986 DHS
Note: [1] The information refers to the first quinquennium of the decade started by the year

The ratios of the observed marital fertility rates to the standard fertility rates point to relatively high fertility rates for women aged 20-24 and relatively low after that, especially until 1970. These ratios are summarized in *m* values which increased until the early 1950s suggesting a rise in the degree of fertility control produced by an earlier stopping of reproductive experience. The *M* values denote fertility lower than the natural standard from 1930 to 1950. The *M* index increased and *m* decreased in the first decade of the 1960s, suggesting that the fertility increase observed in this period was produced by less marital fertility control. Rio women at ages 20-24 in the 1950s and 1960s showed fertility levels above the natural fertility standard. The increase in *m* and decline in *M* resumed in the 1960s. However, in 1980 m decreased in spite of a large fertility decline observed there at that time. A large decline was also observed in M which might be a result of a high level of fertility control among younger women, more spacing, or even a later onset of motherhood. Figure 3.6 presents age-specific marital fertility rates for Rio de Janeiro in 1930-35, 40-45 and 1980-85. This suggests that the fertility decline observed in the 1930s was a result of an earlier stopping of childbearing as stated by demographic transition theory. Nevertheless, the more recent decline seems to be much more a result of more spacing and later onset. This was more marked at 20-29 age group. As hypothesized in Chapter 1, a full transition means changes in all phases of the process of family formation. Fertility transition starts by an earlier stopping and changes in spacing should characterize a more advanced stage of fertility transition.

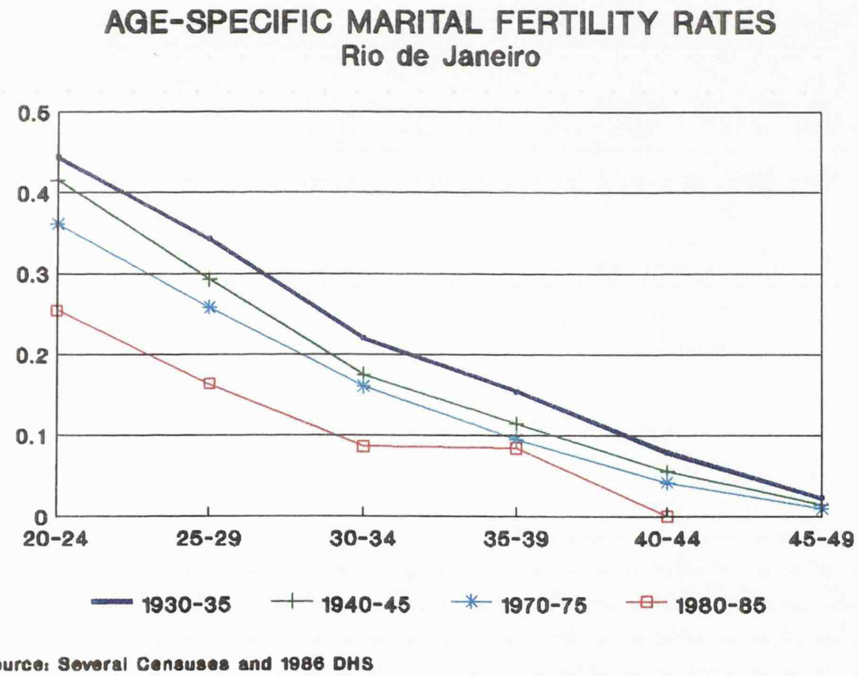


Figure 3.6

As far as São Paulo is concerned, the deviation of marital fertility rates from the standard increased over time and consequently m values increased until the early 1950s and M declined. As in Rio, the M index grew and m decreased in the first decade of the 1960s producing fertility increase. In 1960-65, women at age 20-24 showed fertility levels above the natural fertility standard. The increase in m and decline in M was also resumed in the 1960s. At this time, the variation in M was slightly larger than in m. Nevertheless, in the 1970s variation in m were by far more marked than that in M, clearly suggesting more stopping. Figure 3.7 illustrates this. The picture portrayed for São Paulo fits better with the stated by the classic view of demographic transition theory than that portrayed for Rio de Janeiro.

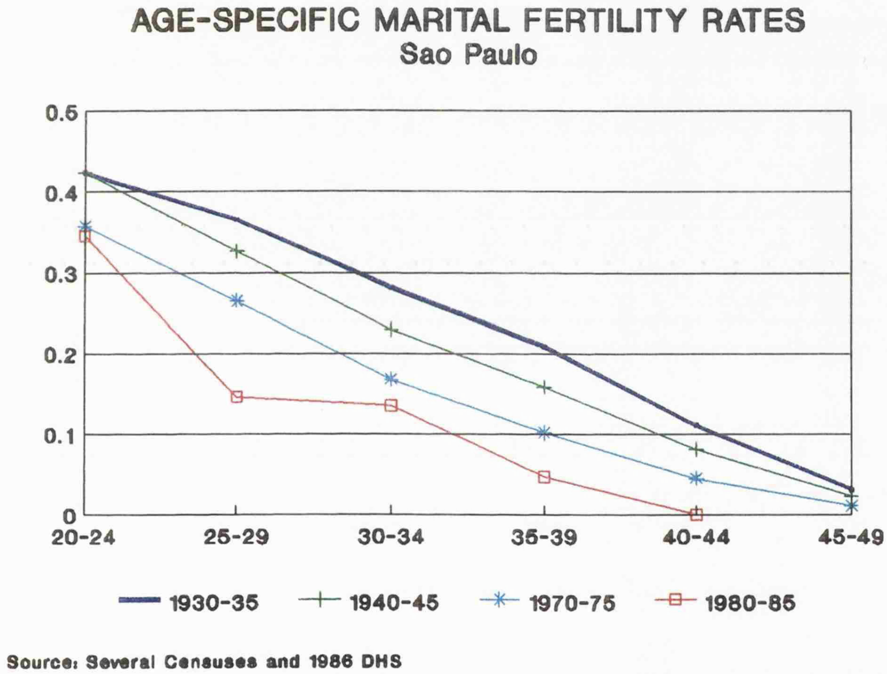


Figure 3.7

In the Northeast, M was almost constant until the first half of the 1970s and declined from 1.136 to 0.795 in the early 1980s. Only in this later period, did Northeastern fertility reach values below the standard of natural fertility. Variations in the deviation of the observed fertility from the standard fertility rates by women's age only became clear in 1970-75. They increased in this decade and produced a reduction in M and a rise in m.

Variation in M was greater than that observed in m. This suggests more prevalent fertility control among younger women, longer spacing and also later onset of motherhood. Figure 3.8 compares Northeastern age-specific marital fertility rates in 1930-35, 1940-45 and 1970-75. These point to a more marked fertility decline among younger women which suggests an important role played by spacing. However, it is also likely that a very early stopping of childbearing is taking place there produced by sterilization. This will be analyzed in the next chapter.

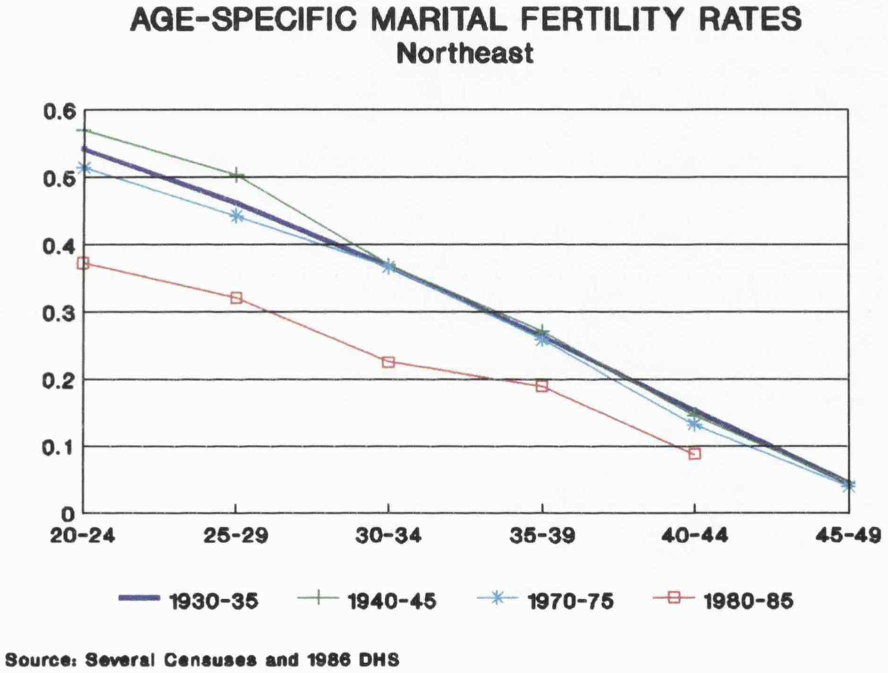


Figure 3.8

3.5-PATTERNS OF FAMILY FORMATION

As will be seen next, fertility decline was paralleled by changes in family formation. This will be analyzed through parity progression ratios, mean completed family sizes and measures of the onset of reproduction.

3.5.1 Parity Progression Ratios

Figures 3.9, 3.10 and 3.11 show parity progression ratios for women aged 50-59 in the 1940, 1950, 1960, 1970 and 1980 censuses for each region in turn. They refer to birth cohorts 1880-90 (BC1), 1890-1900 (BC2), 1900-10 (BC3), 1910-20 (BC4) and 1920-30 (BC5). They point to a reduction in the parity progression ratios and a transformation over time in the shape of their curve from a concave to a convex one in Rio de Janeiro and São Paulo (Figures 3.9 and 3.10). No marked variations were observed in the Northeast. In the Northeast, apart from the progression to the first child, the parity progression ratios exhibited stable high values, above 0.90, over time (see Figure 3.11). There are no indications of more changes in the pattern of family formation there.

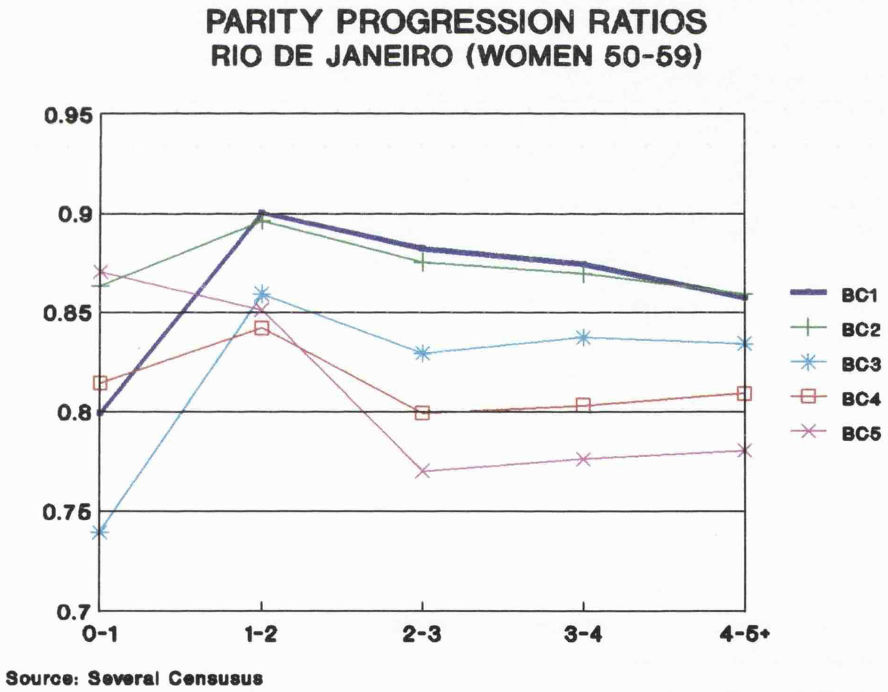


Figure 3.9

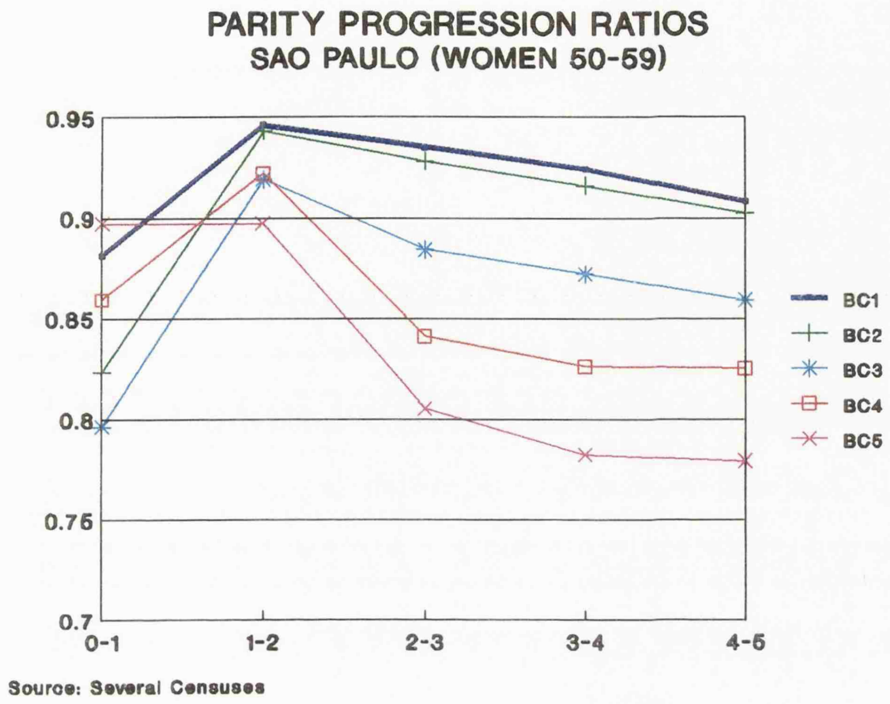


Figure 3.10

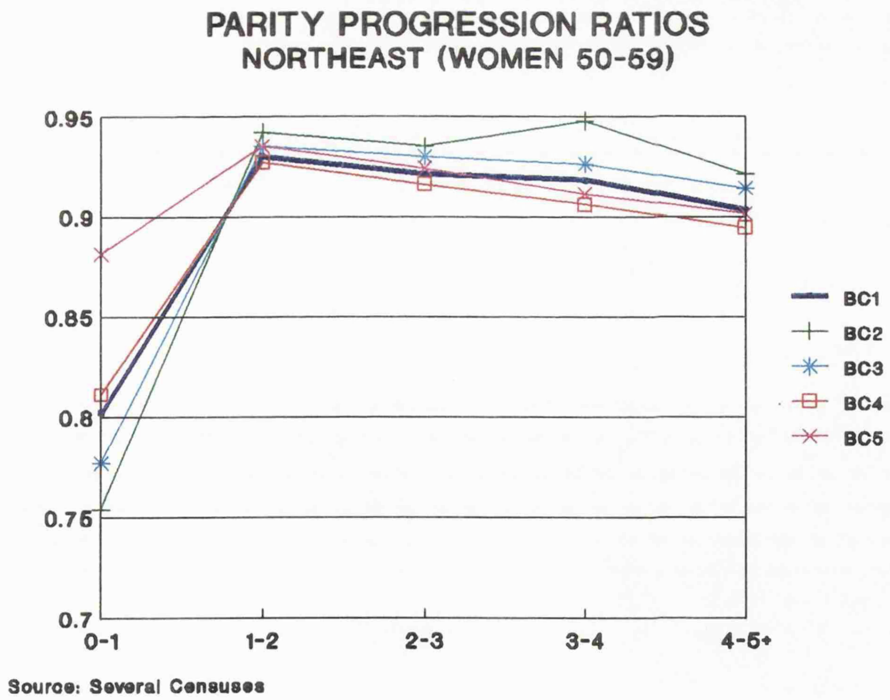


Figure 3.11

Clear changes seem to have started at the same time in Rio de Janeiro and São Paulo, the birth cohort 1900-10, BC3. This is indicated by a dramatic decline in all parity progression ratios between BC2 and BC3. The largest decline occurred in the proportion of women who had a first birth (see Figures 3.9 and 3.10). Changes in the 1900-10 birth cohort suggest that the most marked fertility decline may have occurred in the 1930s. Changes also affected the shape of the curve for BC3 indicating some movement toward a controlled fertility through a reduction in the conditional probability of a woman progressing to the third child compared to her probability of having a second birth. Variations were accentuated in Rio among the following birth cohorts. The curve of the parity progression ratios became more convex. The last two birth cohorts, BC4 and BC5, experienced an increase in the progression to the first parity which partially explains the fertility increase observed in the 1940s and 1950s.

Changes experienced by the 1900-10 birth cohort (BC3) were also marked in São Paulo and continued among the following cohorts (see Figure 3.10). The values of all parity progression ratios declined compared to the previous cohort (BC2). They were higher there than in Rio de Janeiro. Changes among the two following cohorts clearly indicate a parity control fertility regime for the two last birth cohorts, BC4 and BC5. As in Rio, the progression to the third birth seems to be the watershed between families who adopted parity limitation from those who did not. An increase in the proportion of women who had a first birth among these cohorts seems to partially explain the increase in fertility that took place in the 1950s.

Regional differences in the percentage of women starting reproduction were quite marked in the first four cohorts. They seem almost to have been eliminated by the last birth cohort (BC5), through the substantial increase in the proportion of women who had a first child in Rio de Janeiro and the Northeast (see Figures 3.9, 3.10 and 3.11).[182]

[182] It is likely that this increase was associated with variations in nuptiality and primary sterility which will be analyzed in the next chapter.

3.5.2 Mean Completed Family Size

As previously discussed it is predicted by diffusion theory that the new reproductive behaviour is started by a small group of women and then followed by the remainder. This implies a monotonic decline in mean family size and an increasing concentration of fertility around the mean parity reached by the group who started this process. The empirical evidence points to an increase in the dispersion around the mean parity when fertility starts to decline with the concentration coming afterwards. This is especially true for populations which experienced high fertility at the onset of fertility transition.

Table 3.7 displays the mean completed family size of women aged 50-59 in the 1940, 1950, 1960, 1970 and 1980 Censuses for the three regions assuming that these women had completed their experience at the time of the census. The large fertility decline had already dramatically changed mean family size in Rio de Janeiro and São Paulo but it had not yet affected the Northeast. Mean family size was reduced by 1.5 children in Rio and 2.7 children in São Paulo over the whole period. Since fertility decline started first in Rio de Janeiro, this region exhibited a smaller mean family size all the time. São Paulo women had the highest family size in 1940, 6.8 , but as a result of a much faster fertility change, ended up with a mean family size 33% below the Northeast. Mean family size in the Northeast was around or above 6.2.

Table 3.7
MEAN FAMILY SIZE AND STANDARD DEVIATION OF THE DISTRIBUTION OF WOMEN AGED 50-59 BY PARITY AND TIME PERIOD
Brazilian Regions

Time Period	Rio de Janeiro	São Paulo	Northeast
1940			
Mean	5.0	6.8	6.2
Standard Deviation	4.1	4.3	4.4
1950			
Mean	4.3	6.6	6.6
Standard Deviation	3.2	3.6	5.2
1960			
Mean	4.0	5.6	6.9
Standard Deviation	3.8	3.8	4.7
1970			
Mean	3.7	4.4	6.4
Standard Deviation	3.1	2.9	4.3
1980			
Mean	3.5	4.2	6.2
Standard Deviation	2.6	2.7	4.1

Source: Several Demographic Censuses

Table 3.7 also presents the standard deviation of the distribution of women aged 50-59 by parity. The reduction showed by this indicator in Rio de Janeiro and São Paulo may suggest a long term trend of convergence of the distribution towards the mean within both areas. An increase in the standard deviation was observed in both regions between 1950 and 1960. In São Paulo, this coincided with the largest decline observed in the mean family size. Since then, it has substantially declined pointing to a narrowing in the range of fertility outcome in a relatively short time. The high and almost stable standard deviation values presented for the Northeast indicate a high degree of heterogeneity in this distribution. In truth, this region has experienced the largest socio-economic differentials in fertility.[183] Moreover, the scope for heterogeneity is considerable in any high fertility population.

[183] See, for instance, Daly (1985). This issue will be studied in Chapter 5.

3.5.3 Onset of Reproduction

The impact of age at starting reproductive life on fertility levels and the question of which variable, first union or first birth, should be considered for measuring the onset of reproduction are both very well discussed in the literature.[184] Census data, in general, enable only the calculation of the singulate mean at marriage and the equivalent mean age at the first birth, which indicate nuptiality and first birth timing of different cohorts of women in a period of about 35 years. As mentioned before, only the 1940 census and the 1986 DHS asked about mother's age at first birth. Here, age at first birth is taken as an indicator of onset of reproduction. Chapter 4 analyzes age at first marriage.

Table 3.8 displays the mean age at first birth based on census information in order to get indications of regional differences in the onset of reproduction. The estimates are based on the proportion of childless women using the Hajnal method.[185] Rio de Janeiro women started later than those living in the other regions most of the time. This difference is more marked when Rio is compared to the Northeast as these women had the earliest onset. Although this indicator fluctuated over the whole time, it is clear that the Rio and São Paulo women slightly postponed the first birth while the Northeastern brought it forward. It seems that differences in the onset of reproduction play some role in explaining the regional fertility differentials but it does not seem clear what is its effect on the fertility decline.

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[184] This will be discussed in Chapter 4.

[185] See Hajnal (1953).

Table 3.8
MEAN AGE AT FIRST BIRTH BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
1940	23.4	23.2	22.7
1950	23.2	23.2	22.6
1960	22.4	22.5	22.4
1970	24.0	23.8	23.3
1980	23.7	23.5	22.3

Source: Several Demographic Censuses

3.6-NET FERTILITY

This section presents the first attempt at understanding the fertility trends previously described. It looks for the effect of childhood mortality on fertility trends. As seen in Chapter 2, the three study areas exhibited marked regional differences in mortality which probably affected their fertility. Although the classical view of demographic transition theory stresses the interplay between mortality and fertility, demographers in general are much more concerned in looking at fertility independently. There are many ways to study it. Taking into account that either from the point of view of families or from the society, it is surviving children rather than children born that are relevant to the matter of genetic and social reproduction the way to proceed is looking at net fertility. The importance of this was raised by Kuczynski in 1935 and stressed by Wilson (1995). Kuczynski argued in favour of the net reproduction rate as the appropriate measure of fertility in any population.[186] To accept this assumption means also accepting the idea that families plan their size or at least, have an ideal family size at the start of their family formation process.

One of the difficulties faced in studying net fertility is the lack of a well established concept, official data and appropriate measures. Fertility rates, parity progression ratios and so on reflect gross rather than net fertility. Net fertility should be a result of the interplay of fertility, mortality and also migration. From the aggregate point of view perhaps the focus should be on overall population growth. Another possibility

[186] Quoted by Wilson (1995), pp 2-3.

would be the use of net reproduction rates. From the family point of view, some surveys, such as DHS, asked about the number of children ever born, surviving children and children living at home. Brazilian censuses provided information about surviving children according to mother's age, which it is used here, as a surrogate for the result of the interplay of fertility and mortality. A surrogate of total net fertility rates is then calculated in the same way as the TFR using surviving children as the numerator.[187] It is not possible to measure the effect of internal migration on fertility due to small sample numbers in DHS.

Table 3.9 displays the results comparing net fertility with total fertility rates for 1930-35, 1940-45, 1950-55, 1960-65 and 1970-75. Due to few sample numbers, it was not possible to estimate net fertility for 1980-85. The general trends are quite similar to those suggested by total fertility rates. Both rates for Rio and São Paulo declined, increased and declined again over the period. The reduction in total fertility rate was more accentuated than the reduction in net fertility due to the fact that childhood mortality decline was also rapid during the period. For instance in São Paulo, the reduction in TFR was 54% considering the variation between the first and last quinquennia, while that for net fertility was 31%. In Rio, these values were 33% and 16%, respectively. The differentials between the two rates declined during the period. In Rio, it was as low as 6.5%. This suggests some fertility adjustment to mortality conditions.

[187] This was possible because total fertility rates were calculated based on age-specific mean parities.

Table 3.9
TOTAL NET FERTILITY RATES (TNFR), TOTAL FERTILITY RATES AND COEFFICIENTS OF VARIATION (CV) BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast	CV(%)
1930-35				
TNFR	3.6	4.4	4.6	18.9
TFR	4.4	5.7	6.7	29.6
Difference	22.4	29.4	47.0	56.6
1940-45				
TNFR	3.1	3.9	4.7	33.8
TFR	3.8	4.9	6.9	42.2
Difference	25.4	25.3	46.3	24.8
1950-55				
TNFR	3.3	3.6	5.1	29.1
TFR	3.8	4.1	7.2	46.3
Difference	14.1	13.5	37.5	59.1
1960-65				
TNFR	3.5	4.2	5.4	33.4
TFR	4.4	4.6	7.4	35.6
Difference(%)	11.0	9.6	37.5	6.5
1970-75				
TNFR	3.1	3.3	5.2	40.3
TFR	3.3	3.7	6.3	51.4
Difference(%)	6.5	10.2	20.3	27.5

Source: 1940, 1950, 1960, 1970 and 1980 Demographic Censuses

The combination of fertility rises and declining childhood mortality in the Northeast resulted in increasing measures of net fertility (see Table 3.9). A decline was observed in the last decade produced by the more accentuated decline in fertility. The difference between the two fertility measures declined during the whole period but it was still around 20% in 1970-75. Table 3.9 also compares the regional differences in the two fertility measures through the coefficients of variation. This measures the variations in relation to Rio fertility. It points to a trend of increasing regional fertility differentials in both indicators. These differentials are smaller if net fertility is considered suggesting that part of the regional differences in fertility is explained by differences in childhood mortality. Nevertheless, there is an important component in fertility differences not explained by mortality. Summarizing, the decline in childhood mortality seems to have influenced the fertility decline but it is likely that a genuine reduction in the desired family size also took place.

3.7-SUMMARY

For the period when information is available it does not seem possible to identify a single pattern of fertility change in the three areas, although in all of them fertility has dramatically declined. There were found similarities and differences in the experiences analyzed. The first similarity is the three phases that summarizes Rio de Janeiro and São Paulo fertility trends. They consist of a fertility decline followed by an increase and then a renewed and faster decline. For Rio there were some indications of a fertility rise before the fertility decline. The timing of each phase varied between the two areas.

Since the earliest available data, the beginning of this century, Rio de Janeiro has been exhibiting the lowest fertility rates. Although there is no evidence that a parity-related fertility control regime had started there before the 1930s, its pattern of family formation was already distinct from those of other regions at the beginning of the century, later onset of reproduction and lower probabilities of progression to high parity births. During the 1930s it is clear that fertility was becoming more parity dependent and the oldest women aged 30 and over experienced very low fertility rates compared with the pattern of natural fertility assembled by Coale and Trussell. The progression to the third birth seem to be the watershed between families who started this regime. Fertility rose during the 1950s as a consequence of less marital fertility control and shorter birth spacing. This could be an effect of immigration from areas of higher fertility or even a kind of "baby boom" as happened in many European and North America countries at that time. The modernization which followed the II World War may also had stripped out some functions of the housewives and reduced the opportunity costs of children. This increase contradicts one of the major generalizations of demographic transition theory: once fertility declines, the trend is irreversible and sustained until fertility reaches replacement levels or thereabouts.

Fertility decline resumed in the second half of the 1960s at a much faster speed and it was widespread among all women and all age-groups over 20 years. This more recent decline seems to be much more a result of longer spacing and later onset than earlier stopping of reproduction. This distinguishes Rio and São Paulo experiences and also emphasises the importance of these two other stages of the family formation process in fertility movements.

São Paulo fertility rates followed a similar pattern to those of Rio de Janeiro but with different timing and speed. At the beginning of the century, São Paulo fertility was similar to that of the Northeast. There are some indications that fertility started to decline there by this time. At the first stage it seems to be more a consequence of a longer spacing, probably longer breastfeeding, and a reduction in the proportion of women who started motherhood than earlier stopping of childbearing. A parity-related control fertility regime seems to have started in this area in the 1930s, as a result of a more accentuated fertility decline among women aged 30-39 and a reduction of births at third parity as in Rio de Janeiro. Changes in the index of marital fertility control happened at a higher speed there than in Rio. They were not homogeneous among all age groups. Although the fertility of women aged less than 25 increased in the 1940s, the strong decline in the rates of women 30-39 resulted in a reduction of total fertility rate and an increase in the index of marital fertility control. A fertility increase was also seen in the 1950s but it was less marked than in Rio. It was also a result of an increase in fertility rates of all women aged 25 and over who during this period seemed to space less and stop later.

Fertility decline also resumed in the late 1960s in São Paulo but was less intense than in Rio de Janeiro. As a result, in the first half of the 1980s São Paulo total fertility rate was 0.4 children higher than that of Rio de Janeiro. São Paulo fertility decline was much more affected by the earlier stopping of older women than that observed in Rio. Another correspondence found in the Rio and São Paulo experiences of fertility decline is the narrowing in the range of options in family size in a relatively short time.

The Northeast reproductive pattern has been quite different. There was no evidence of fertility control in this area before the 1970s. The total fertility rate was almost stable around seven children until this time. Later starting and a high proportion of women who did not start motherhood prevented fertility from being even higher during this period. An increase in fertility was observed in the 1950s and 1960s among women aged 20 and over, probably as a consequence of an increase in nuptiality and to shorter birth intervals. This seemed to follow the pattern delineated by Dyson and Murphy (1985) that assumes a pre-transition fertility increase. Fertility decline started in the 1970s and was strongly intensified in the early 1980s mostly by younger women, 25-34 years old. As in Rio, this seems to be more a result of more spacing than earlier stopping of childbearing. However, it does not suggest advanced fertility transition as in the first half of the 1980s, total fertility rate (5.2) was twice as high as São Paulo (2.6).

The first attempt at understanding the regional fertility differences was carried out looking at the impact of childhood mortality decline on fertility decline. A proxy measure of net fertility was calculated and compared to gross fertility. High fertility seems to be combined with high mortality and low fertility with low mortality. The differences between the two indicators are dramatically reduced when both rates are low. As declines in gross fertility were more marked than in net fertility it seems fair to suggest that fertility reduction has been partially a response to the mortality decline and has also expressed changes in the desired family size. The regional differences are narrower when net fertility measures are considered. However, some of the regional difference still persisted.

The three experiences showed that fertility has been also in movement. This means that it has dramatically declined but it has also increased. Changes in fertility have been a result of changes in the three phases of the process of family formation. Although the early stopping of childbearing has played the most important role in the fertility decline, spacing seems to play an important role when fertility transition advances. Another characteristic of advanced transitions is likely to be the narrowing of the ranges of fertility outcomes. The distribution of women by parity has tended to be concentrated around the mean. Finally, there is a part of the decline in fertility that seems to be an adjustment to mortality and another that expresses a desire for smaller family.

Chapter 4

THE PROXIMATE DETERMINANTS OF FERTILITY:

An Aggregate Analysis

4.1-INTRODUCTION

This chapter analyzes the *demographic components* of the fertility decline in the three observed areas and their regional variations. There are several methodological approaches at both aggregate[188] and individual[189] levels that attempt to apportion out the amount of fertility which is due to each one of the proximate determinants.[190] What is used here is one of the most widely understood approaches at aggregate level originally proposed by Bongaarts (1978) and adapted by Casterline et al (1984).

According to Bongaarts (1978), fertility is mainly determined by four factors: marriage, induced abortion, post-partum infecundability and contraception. Each of these four determinants is analyzed separately in sections 4.2, 4.3, 4.4 and 4.5, respectively, and other relevant determinants are considered in section 4.6. The aggregate impact on fertility levels is measured in section 4.7. Section 4.8 summarizes the principal findings.

This chapter is based on demographic censuses, on the 1986 DHS and on other available survey data such as the Contraceptive Prevalence Survey (CPS), the National Investigation of Human Reproductivity (NIHR) and the 1986 General Household Survey

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[188] See: Bongaarts (1978; 1982; 1985) and Casterline (1984).

[189] See: Hobcraft and Little (1984); Easterline and Crimins (1985) and Moreno (1991).

[190] All of these are based on the intermediate variables proposed by Davis and Blake (1956).

(PNAD). As noted in Chapter 1, the reporting of marital status in some censuses is defective. Information about contraception, breastfeeding and abortion was fragmentary in both regional and time coverage until the 1986 DHS survey. Information about abortion was misreported in all surveys including the 1986 DHS. No direct information about primary sterility is available. As a result, this Chapter is an attempt to put together different sources in order to draw a historical trend of the contributions of the various proximate determinants on fertility trends. The analysis is much more complete for 1986 as it is based on a DHS survey.

4.2-NUPTIALITY TRENDS

The Brazilian attitude towards marriage was inspired by the Catholic Church which resulted in a concentration of the reproduction function within marriage, though marked exceptions existed. According to Mortara, 90.7% of the women aged 12 or over at the 1940 Census who declared to have borne live children were married. At the same time, he observed that the influence of marriage on fertility varied considerably by Brazilian states. For instance, in Maranhão (Northeast), the mean number of live births per 100 single women aged 12 and over was 130.8. In São Paulo, the comparable mean was 9.2.[191]

The impact of nuptiality on fertility levels was also measured by Mortara who compared two groups of states: one formed by the ten states with the highest fertility rates and the other formed by the ten with lowest fertility rates in 1940. He showed that eight out of the ten Brazilian states with the highest fertility exhibited the highest proportion of 20-29 years old ever married women. Conversely, in seven out of the ten states with the lowest fertility he found the lowest proportion of ever married women in the same age group.[192]

[191] See: Mortara (1954), pp 453.

[192] See: Mortara (1954), pp 452-6

Based on the 1970 Census data for Brazilian states Berquó, using multivariate regression, found out that for women aged less than 20 nuptiality explained most of their fertility. For women older than that she found that per capita income played the most important role in their fertility. The other variables considered were: sex ratio, migration and illiteracy rates.[193] Silva et al estimated the impact of the proximate determinants on fertilty at individual level for Brazil as a whole using the 1986 DHS. Their findings point to duration of marriage as one of the two most important determinants in Brazil at that time.[194]

The classical analysis of nuptiality searches to identify the timing and the intensity of nuptiality for different cohorts. Here, it starts by examining temporal changes and regional variations in the distribution of the female population according to marital status and afterwards it investigates the timing and intensity of nuptiality. All of the analysis refers to the female population.

4.2.1-Marital Status

The reported percentages of women aged 15-49 in every marital status are shown in Table 4.1 for 1940, 1950, 1960, 1970, 1980 and 1986. For 1986, it is considered women aged 15-44 as the data are based on the DHS whose sample only includes women at this age. Four marital categories are considered: married, divorced, which included *desquitadas*, (women who got desquite. *Desquite* was a legal substitute for separations before divorce became legal in Brazil) and informally separated, widowed and the single.

[193] See Berquó (1973), p 25.

[194] See: Silva et al (1990), p 16.

Table 4.1
PERCENTAGE OF WOMEN AGED 15-49 BY MARITAL STATUS
Brazilian Regions

Regions	MARRIED	SEPARATED	WIDOWED	SINGLE
São Paulo	61.4	0.4	4.3	33.7
Northeast	49.0	0.3	3.6	46.2
1950				
Rio de Janeiro	51.4	0.4	5.4	42.6
São Paulo	61.6	0.2	3.5	34.2
Northeast	49.4	0.1	3.7	44.3
1960				
Rio de Janeiro	57.7	3.4	3.4	35.0
São Paulo	63.3	2.2	2.6	31.7
Northeast	54.3	4.3	2.7	38.8
1970				
Rio de Janeiro	53.4	3.6	1.9	40.1
São Paulo	57.9	2.5	2.4	37.1
Northeast	52.7	4.0	2.4	41.2
1980				
Rio de Janeiro	55.9	4.4	2.2	38.6
São Paulo	59.9	3.2	2.0	35.8
Northeast	56.0	3.4	1.9	39.3
1986(1)				
Rio de Janeiro	59.2	7.3	xxx	32.4
São Paulo	58.4	4.6	xxx	36.3
Northeast	57.6	6.2	1.5	34.6

Source: Several Demographic Censuses and 1986 DHS
Note: (1) Women aged 15-44
xxx sample less than 30

Strictly speaking according to Table 4.1, only the category of widows is completely comparable over all of the time period. This group has not been very important among the group of women of reproductive age and it size decreased dramatically as a result of the gains in life expectation at birth. This decline was less marked in the Northeast where this percentage dropped from 3.6% to 1.5%. In 1940, the highest percentage of widows was found in Rio and the lowest in the Northeast. In 1986, the sequence was reversed; the Northeast exhibited the highest percentage and the two other areas did not have significant numbers.

One problem in the consistency of the Brazilian data on marital status is related to the reporting of separated and divorced women. Divorce in Brazil was legalized only in 1977. However, reporting of foreign divorces, legal separations or *desquites* increased in the years prior to the legislation. As divorce was not legally recognized it was common for women who entered a union after separation to report themselves as separated rather than married. This also brought about an underreporting of women in unions. This increase in the percentage of separated and divorced women is probably a combination of an improvement in reporting separations and a genuine increase. The largest rise was observed in the Northeast where this percentage rose by 1,238% throughout the period. The highest percentage of divorced and separated women in 1986, was found in Rio de Janeiro with about 7.3% of the women aged 15-44 years in this group (see Table 4.1).

Women in consensual unions were classified as single or separated until the 1960 Census. Since then they have been grouped in the married category. This resulted in an overenumeration of single women in the two previous censuses and in an underenumeration of women in reproductive unions. It can be seen in Table 4.1 a decline in the percentage of single women in all regions and an increase in the percentage of married women from 1950 to 1960 probably as a result of the mentioned changes. Changes in reporting were much more marked in Rio and the Northeast where informal unions have been more important. The inclusion of consensual unions in the category of married resulted in a much higher increase in the percentage of married women in these two areas than in São Paulo. During the first half of the 1980s, the percentage of married women increased in Rio de Janeiro and the Northeast and declined in São Paulo. It reflects probably differences in reporting as the data came from different sources. The percentage of single women increased during the 1960s and declined since then in all regions. The only exception was in São Paulo in the first half of the 1980s. São Paulo had the lowest percentage of single women until 1980 and exhibited the largest one in 1986. Before that Northeastern women showed the highest percentage of single women.

As discussed before, it is quite likely that single women who had children have been engaged in informal unions as their fertility has been relatively high. Table 4.2 displays the percentage of single women who reported having children and those in unions in a broader sense. Those are defined here as the grouping of married women with the single ones who had children. The relatively high percentage of single mothers stresses the importance played by informal unions in Rio de Janeiro and the Northeast. If women in union are considered as married the regional differences in nuptiality are dramatically reduced, especially that between Rio and São Paulo and that between Northeast and São Paulo in 1940 and 1950. The differences between married women and women in union were reduced in 1960 as a result of the new Census' definition of marriage. In spite of the more recent censuses have used a broader definition of marriage these data may be also affected by the way unions are formed and by their significance to the respondents.

Table 4.2
PERCENTAGE OF WOMEN AGED 15-49 IN UNION AND SINGLE MOTHERS BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
1940			
In Union	55.7	62.5	57.6
Single Mothers	7.3	1.1	8.6
1950			
In Union	57.7	62.6	54.7
Single Mothers	6.4	1.0	5.3
1960			
In Union	58.6	63.6	55.6
Single Mothers	0.9	0.3	1.3
1970			
In Union	55.3	58.9	54.9
Single Mothers	1.9	1.0	2.3
1980			
In Union	58.7	62.1	58.4
Single Mothers	3.6	2.2	2.4
1986[1]			
In Union	65.3	64.1	62.6
Single Mothers	6.2	5.7	5.0

Source: Several Demographic Censuses and 1986 DHS
Note: [1] Women aged 15-44

Table 4.2 shows that São Paulo women experienced a much higher nuptiality than those in Rio and the Northeast until 1980 even using the new definition. The comparison of Table 4.1 and 4.2 indicates that most São Paulo unions are legal ones. This may be associated with their relatively higher fertility levels, especially until 1960. The percentage of single women with children was very low but it increased markedly in the 1970s and 1980s. Rio de Janeiro and the Northeast exhibited the highest percentage of single mothers for most of this time. This percentage declined from 1950 to 1960 as a result of changes in reporting and increased after that. Nuptiality was reduced during the 1960s in all regions but this was less marked in the Northeast. After the 1970s it increased again in all areas even in São Paulo in the first half of the 1980s.

Since the 1960s there has been a rise in the percentage of reported women in consensual unions in all regions except in Rio de Janeiro during the 1980s (see Table 4.3). This region had experienced the highest percentage of women in consensual unions until 1980. In 1986, this kind of union came to be more important in the Northeast. The maximum percentage of women in consensual unions was found there, 12.1% of the women aged 15-44 in 1986. Although part of the increase of the later percentage is a result of improvements in census reporting part of it seems genuine[195]. São Paulo women experienced the largest increase in this kind of union and in the percentage of single mothers but they still showed the smallest percentage in this group (7.8%).

Table 4.3
PERCENTAGE OF WOMEN AGED 15-49 IN CONSENSUAL UNIONS
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
1960	6.9	1.8	5.5
1970	7.5	2.5	5.3
1980	12.1	5.8	8.7
1986[(1)]	10.3	7.8	12.1

Source: 1960, 1970 and 1980 Demographic Censuses and 1986 DHS
Note: [(1)] Women aged 15-4

[195] The increase in consensual unions was already noticed for Brazil as a whole by Goldani Altmann and Wong (1981), Greene and Rao (1992) and Lazo (1994). Lazo also confirms the increase in this kind of union in the Northeast and São Paulo. This is pointed as a consequence of ethnical composition, socio-economic status, urbanization and a shortage of men in the matrimonial market. Nevertheless, there is no agreement about the historical importance of consensual unions in Brazil. Most authors consider that this tradition is not new. It dates from the colonial time. See for instance: Mortara (1956), Berquó and Loyola (1984), Henriques (1980), Greene (1992). Some authors did not find empirical support for this. For instance, Mendonça (1966, p 114) showed that in 1963, women in consensual unions represented only 6.9% of the total of unions in the Rio de Janeiro city. One consensus is about the regional differences in the role played by this kind of union. See, for instance Lazo (1994), p 6.

The difference between women in formal and informal marriage with regard to their fertility experience may be a consequence of their socio-economic status. In general, it has been shown that women in informal marriage tend to be poorer. However, the recent increase observed in this kind of union may be more clearly associated with liberal attitudes that have been affecting all groups but to a larger extent younger and educated women living in urban areas. There is considerable discussion of the relationship between kinds of union and fertility but it is difficult to find a single pattern which summarizes it. According to a work by the United Nations, " the tendency of women to start their conjugal life in less formal unions creates a pattern in which many women find themselves, during their peak of reproductive years in unions which are, on the one hand, less conducive to effective fertility control and, on the other hand, less stable. The lack of stability can be a factor in ultimate fertility outcomes because, while it may lead to a loss of exposure time, it also leads to a greater chance of multiple partners. The number of partners a woman has had been shown to be positively related to fertility regardless of union type. This is because of men's desire to father children with each partner".[196]

Data gathered by the National Investigation of Human Reproduction in 1975 point to lower fertility among women in consensual unions in two areas located in São Paulo state and three in the Northeast. Exceptions were found among Recife (Northeast) women aged less than 24 years and 30-34 years and women married more than 20 years in the three Northeast areas.[197] Considering Brazil as a whole and using the 1986 DHS data, Greene found out that the mean number of children borne by women within informal marriage was slightly lower (3.1) than in formal marriage (3.2) with its timing concentrated in the early years of the marriage. Instability may play a role in driving fertility in the early years of marriage. If PNAD 1984 data are considered, a larger difference can be observed, 3.0 and 3.5, respectively.[198]

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[196] See: United Nations (1988), p 333.

[197] In Recife this happened among women at duration 15-19 year. Quoted by Henriques (1980), pp 524 and 527.

[198] See: Greene (1991a), p 971.

Henriques also based on the 1986 DHS concluded that fertility control is weaker within consensual unions. Thus, lower overall fertility compared to legally married fertility could only be reached through experiencing more frequent break-ups which would imply longer periods of non-exposure to the risk of fertility.[199] Lazo's results based on the 1976 and 1984 PNADs point to higher fertility within consensual unions. Nevertheless, there is a tendency towards convergence as a result of the fertility transition.[200] Data about the fertility of women in consensual unions has not been published by the demographic censuses. Information based on the 1986 DHS does not allow a precise conclusion to be drawn due to few sample numbers.

4.2.2-Timing of Nuptiality

Empirical demographic studies have examined the linkage between nuptiality and fertility[201] and all recognize the timing of nuptiality as a crucial determinant of fertility. It marks the beginning of exposure to the risk of childbearing in most societies. Women who marry early have larger completed families. Moreover, delayed marriage may affect fertility indirectly through the acceptance of family planning because underlying factors that are associated with an increase in age at marriage are also related to a greater use of contraception. Others studies[202] consider age at first birth as the initiation of the exposure time and relate it to family size

It is usual to measure the timing of nuptiality through the age distribution of married women. Summary measures such as the mean or median age are frequently calculated. Table 4.4 show the singulate mean age at marriage (SMAM),. It is based on the proportion of women reported as single at the different age-groups, using Hajnal

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[199] See: Henriques (1989), p. 170

[200] See: Lazo (1994), p 7.

[201] Bumpass and Rindfuss (1978); Trussel and Menken (1978); Adlakha, Ayad and Kumar (1991); among others.

[202] Bumpass and Rindfuss; Rindfuss, Morgan and Swicegood (1983).

(1953) method. They refer to the years 1940, 1950, 1960, 1970 and 1980. Means for 1986 will be considered separately from those of the previous years. In order to reduce the impact of the underreporting of women in consensual unions single women reporting having a birth are considered married.

Table 4.4
SINGULATE MEAN AGE AT MARRIAGE BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
1940	22.7	22.0	22.1
1950	22.7	22.3	22.0
1960	22.8	22.1	22.3
1970	23.6	23.1	22.8
1980	22.8	22.5	22.2

Source: Several Demographic Censuses

The SMAMs displayed in Table 4.6 indicate regional differences in nuptiality timing. Rio de Janeiro women had the highest SMAM through all the period and São Paulo exhibited the lowest mean in 1940 and 1960. No marked changes were observed from 1940 to 1960 in any region. A slight increase was experienced by São Paulo women during the 1940s and another by the Northeast women during the 1950s. During the 1960s, SMAM increased in all regions and then declined in the 1970s. The increase was more intense in São Paulo (one year) followed by Rio de Janeiro (0.8 years) and the least in the Northeast (0.5 years). The SMAMs declined over the 1970s. This was more important in Rio de Janeiro (0.8 years), followed by the Northeast (0.7 years) and then by São Paulo (0.6 years). This decline seems to parallel an increase in nuptiality provoked by a rise of the number of women in consensual unions in all regions or by changes in marital status reporting (See Table 4.3). Roughly speaking in 1980, Rio and Northeast women reached the same nuptiality timing they had in 1960. São Paulo women kept it later. Northeast women has had the early onset since 1970. The regional differences in SMAMs were not greatly affected over time; the range of variation fluctuated from 0.7 to 0.8 years and declined to 0.6 years in 1980.

Another attempt at measuring time period variations in the starting of unions is provided in Table 4.5 which displays life table measures of the median age at first union for three five years periods before the 1986 DHS (women who married in 1980-86, 1975-80 and 1970-75).[203] These means are based on women's reporting about the date of first union. According to these results, Rio and Northeast women postponed the start of unions. In Rio, this occurred basically in the 1980s and resulted in an increase of 0.6 years in the mean age at first union. In the Northeast, marriage was postponed during the second half of the 1970s (0.9 years) and brought forward in the 1980s (0.5 years). In São Paulo, the mean age at starting unions remained stable. These trends differ from those indicated by the census data because with the later data is not possible to precisely determine the time when unions really started. DHS data are based on reported date of first union. The DHS results for the earliest period might be overstated as they were informed by older women who could have forgotten first unions, especially if they were informal.

Table 4.5
MEDIAN AGE AT STARTING UNIONS BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro		São Paulo		Northeast	
	Mean	N	Mean	N	Mean	N
1980-86	22.0	148	20.8	139	20.1	323
1975-80	21.4	131	20.7	124	20.6	308
1970-75	21.3	119	20.8	101	19.7	234

Source: 1986 DHS

4.2.3 The Intensity of Nuptiality

To measure the intensity of nuptiality or permanent celibacy is considered the percentage of women aged 50-59 that remained single. These are shown in Table 4.6 for 1940, 1950, 1960, 1970 and 1980. As the DHS sample includes only women aged 15-44 this percentage could not be calculated for 1986. The long term trend pointed by the

[203] The more recent period contains six years in order to make sure that at least 50% of the women were exposed during the whole period.

percentage of single women in Rio and the Northeast was its reduction would suggest an increase in nuptiality. However, changes in reporting of marital status especially between 1950-60 may have affect this trend. The trend pointed by these percentages in São Paulo was in the sense of a reduction in nuptiality.

Table 4.6
PERCENTAGE OF SINGLE WOMEN AGED 50-59
BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
1940	16.9	5.9	20.4
1950	14.4	6.2	18.2
1960	9.2	6.0	9.8
1970	10.3	7.1	10.6
1980	9.9	7.2	9.3

Source: Several Demographic Censuses

4.3-CONTRACEPTIVE PREVALENCE

4.3.1 Time-Period Trends

It has already been well documented that marital fertility control has been the most important proximate determinant of Brazilian fertility decline.[204] Estimates of the Coale-Trussell indexes of fertility control seen in Chapter 3 point to the existence of marital fertility control in Rio de Janeiro since the 1930s. A further survey undertaken in Rio de Janeiro city showed that in the early 1960s 57.4% of the women aged 20-29 years had already used contraception.[205]

As mentioned before, no information is available about contraceptive use before 1986 at the national level. Table 4.7 summarizes the results on contraceptive prevalence obtained by a number of regional surveys before the national DHS. All information refers to ever married women and what is considered here are only the geographical sub-divisions of the three study areas.[206] There is a noticeable degree of consistency among the available results. They show a clear temporal increase in contraceptive use and a growing preference for sterilization. One survey undertaken in Rio de Janeiro city showed that in 1963, 32.5% of the women aged 20-59 were using contraceptives and the most important method was rhythm method.[207] Another points to a percentage of 33.3% in the number of married women aged 20-50 systematically using contraceptives in the same city and in the same period.[208]

[204] See, for instance: Merrick and Berquó (1983), p 48; Silva et al (1990), p 3 and Martine (1995), pp 6-8.

[205] See: Iutaka (1965), p 112.

[206] This table is an updating of the one presented by Merrick and Berquó (1983), p 45.

[207] It was also noted by this author that the use of this method was not carried out properly which affected its effectiveness. See: Iutaka (1965), p 113.

[208] See: Hutchinson (1964), p 30.

TABLE 4.9
CONTRACEPTIVE PREVALENCE FOR MARRIED WOMEN:
summary of survey data
Brazilian Regions

		USERS		METHOD (%)	
SITE OF SURVEY	DATE	% Women	Pill	Sterilizaton	Others
RIO DE JANEIRO					
Rio de Janeiro city[1]	1963	38.1	7.3	16.0	76.7
Rio de Janeiro city[1]	1969	31.3	45.0	na	55.0
SÃO PAULO					
São Paulo city	1968	66.0			
São José[2]	1975	74.9	60.8	8.3	
Sertãozinho[2]	1975	69.2	60.3	8.7	
São Paulo state[3]	1978	63.9	43.5	27.7	
NORTHEAST					
Parnaiba-Urban[2]	1975	27.7	36.4	30.9	
Parnaiba-Rural[2]	1975	20.7	29.4	55.9	
Recife[2]	1975	57.5	30.7	37.1	
Piauí capital[2]	1979	44.9	26.1	62.8	11.1
Piauí rest[1]	1979	28.8	33.9	46.7	19.4
Pernambuco capital[1]	1980	51.5	24.1	56.9	19.0
Pernambuco rest[1]	1980	35.0	36.0	35.1	28.9
Rio G. Norte urban[1]	1980	55.0	37.6	42.9	19.5
Rio G. Norte rural[1]	1980	35.0	38.9	23.7	37.4
Bahia capital[1]	1980	47.8	38.4	23.8	37.8
Bahia rest[1]	1980	27.4	37.4	33.7	28.9
Paraíba[1]	1980	43.2	36.3	33.1	30.6

Source: (1) Quoted by Merrick and Berquó(1983), p 45
(2) Merrick and Berquó(1983), p 182
(3) Berquó(1985) et al p 51

The survey data shown in Table 4.7 highlight the higher degree of fertility control in São Paulo compared to Northeast areas for the same period during the 1970s. The highest prevalence rate was found in São José and Sertãozinho[209] where 74.9% and 69.2% of married women, respectively, were making use of contraception. These

209 Both are located in São Paulo state. The results came from the National Investigation in Human Reproductivity. It was already suggested by Merrick and Berquó that this survey might have overestimated the proportion of women using contraceptives. See Merrick and Berquó (1983), p 184.

proportions were even higher than those noticed in the São Paulo capital. The pill was the most used method in all of São Paulo sub areas. The lowest prevalence rate was observed in rural areas of Parnaiba[210] in 1975; 20.7% of married women. Apart from the urban area of Parnaiba, sterilization was the most used method in the two other Northeast areas. Elsewhere the pill played the most important role among the methods used. Another indication of regional differences in pill use was found in a survey undertaken in Brazilian pharmacies about contraceptive sales. The results showed that in 1972, the state of São Paulo was responsible for 33% of all national sales, Rio de Janeiro 15% and the North-Northeast for 18%.[211]

The Contraceptive Prevalence Survey (CPS) indicated that in 1978 63.9% of currently married women aged 15-44 were using contraceptives in São Paulo (see Table 4.7). About 43.5% of the women using some method were using pill and 27.3% were sterilized. Further CPS surveys were carried out in 1979 and 1980 in five Northeast states (Piauí, Pernambuco, Rio Grande do Norte, Paraíba and Bahia) in both the capital and rest of each area. These indicate that sterilization was the most used contraceptive method in Piauí, urban areas of Rio Grande do Norte and in the capital of Pernambuco.[212] The pill was the favourite method used in the other areas.

4.3.2 Contraceptive Prevalence in 1986

The DHS 1986 results point to an increase in contraceptive prevalence rates and give evidence of the predominant use of only two contraceptive methods; female

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[210] This is a sub region located in the state of Piauí.

[211] In 1970, Sao Paulo, Rio and the Northeast accounted for 19%, 9.6% and 34% of the total of Brazilian population, respectively. This means that the pill sales per capita were: 1.73, 1.56 and 0.53, respectively for Sao Paulo, Rio and the Northeast. See: Richers and Almeida (1975), p 12.

[212] It is important to stress that female sterilization was illegal in Brazil at that time. The Medical Code of Ethics states: "Sterilization is condemned, but may be practiced in exceptional cases, when there is a precise indication approved by two medical doctors in a consulted conference". (Quoted by Merrick and Berquó (1983), pp 186).

sterilization and the pill (see Table 4.8). Regional differences in contraceptive use are quite pronounced. São Paulo showed the highest prevalence rate involving 71.4% of the ever-married women. Compared to the CPS results for 1978 these women experienced an increase of 10% in prevalence in eight years. More than this, this increase was entirely produced by the rise in the percentage of sterilized women which grew from 16.1% to 29.8% of ever married women.[213] In terms of effectiveness, this means a rise of 14% between the two surveys.[214] The difference between the percentage of contraceptive users in Rio and São Paulo was not so clear. In contrast, the comparable percentage was 51.1% in the Northeast. Although relatively low, the 1986 Northeast prevalence is a result of an increase of 38% in the percentage of users and a rise of 47% in efficacy compared to the 1980 CPS.[215] Nevertheless, about a quarter of Northeast married women had never used contraceptives in 1986. The comparable percentage for São Paulo and Rio de Janeiro was much lower, about 8%.

[213] According to Berquó, Oliveira and Camargo in the São Paulo capital 6.9% of ever married women were sterilized in 1965. See: Berquó, Oliveira and Camargo (1977), p 464.

[214] For the CPS results, see: See Berquó et al (1985), p 51.

[215] This percentage constitutes an weighted average based on the four states where the CPS was undertaken. See Goldberg et al (1988), p 952.

Table 4.10
EVER-MARRIED WOMEN CURRENTLY CONTRACEPTING BY METHOD
Brazilian Regions

Method	Rio de Janeiro	São Paulo	Northeast
Female Sterilization	31.0	29.8	24.4
Pill	25.3	23.5	16.1
Natural Methods$^{(1)}$	7.9	8.8	7.9
Other	xxx	7.8	2.6
Total	69.2	71.4	51.1
Efficacy	0.911	0.893	0.904
Effectiveness	63.0	63.7	47.0
N	506	490	1,172

Source: 1986 DHS
Note: $^{(1)}$ Withdrawal and Periodic Abstinence
xxx sample number <30

As regards the mix of methods, female sterilization predominated in all three regions and was more important in Rio de Janeiro (see Table 4.8). The pill played the second most important role and it was most widely used in Rio de Janeiro as well. The percentage of women using natural methods (withdrawal and periodic abstinence) was very low and the use of other methods (IUD, diaphagram and condom) was even lower. Among the three areas both percentages were higher in São Paulo. Use-efficacy varies according to the characteristics of methods and the proportion of users. Using the contraceptive efficacy weights derived by Laing (1978)[1], indexes of effectiveness were estimated and the results are also shown in Table 4.8. The highest prevalence rate found in São Paulo was partially counterbalanced by its lowest effectiveness value given the higher incidence of sterilization in the two other areas.

Contraceptive prevalence is affected by women's age and parity. Although it is recognized that marital duration also affects prevalence, no analysis by marital duration is undertaken here as it is assumed to have a strong association with women's age. Figure 4.1 displays the prevalence age-specific rates for married women of the three regions. The percentage of current users increases with age up to 30-34 years in all

[1] Quoted by Silva et al (1990), p 33.

childbearing. Among the total number of sterilized women 85% did so before being 35 years old in Rio de Janeiro, 81% in São Paulo and 77% in the Northeast. The median age at sterilization was 30.2 years in Rio and São Paulo and 30.5 the Northeast, respectively.

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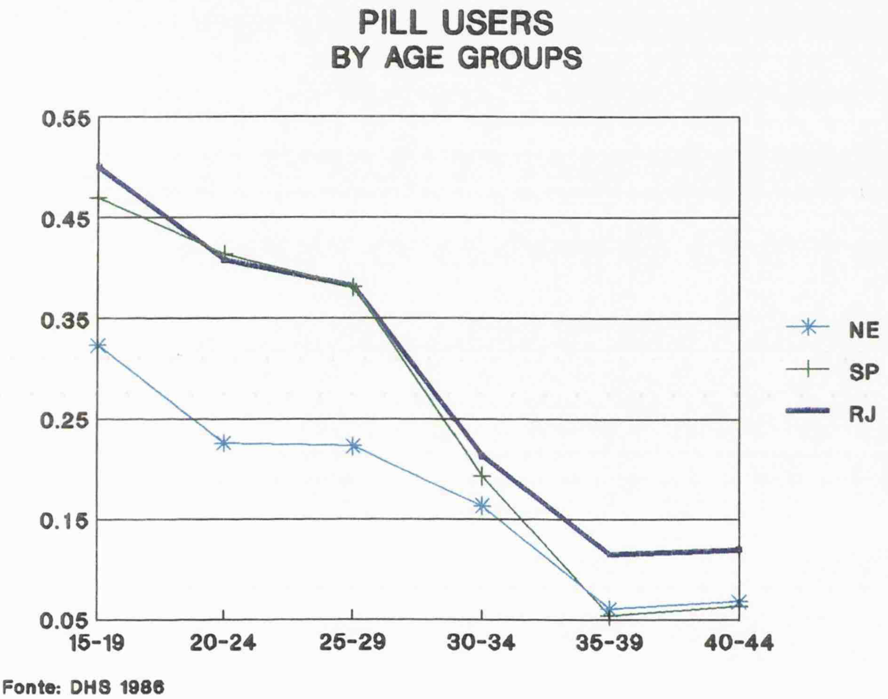

regions. At this age group, 79% of the São Paulo married women were using method. The comparable percentage for Rio de Janeiro was 73% and for the Northeast, 62%. São Paulo women at age 30-39 experienced the highest prevalence rates among the three areas. Rio women showed the highest proportion of users for the other age groups.

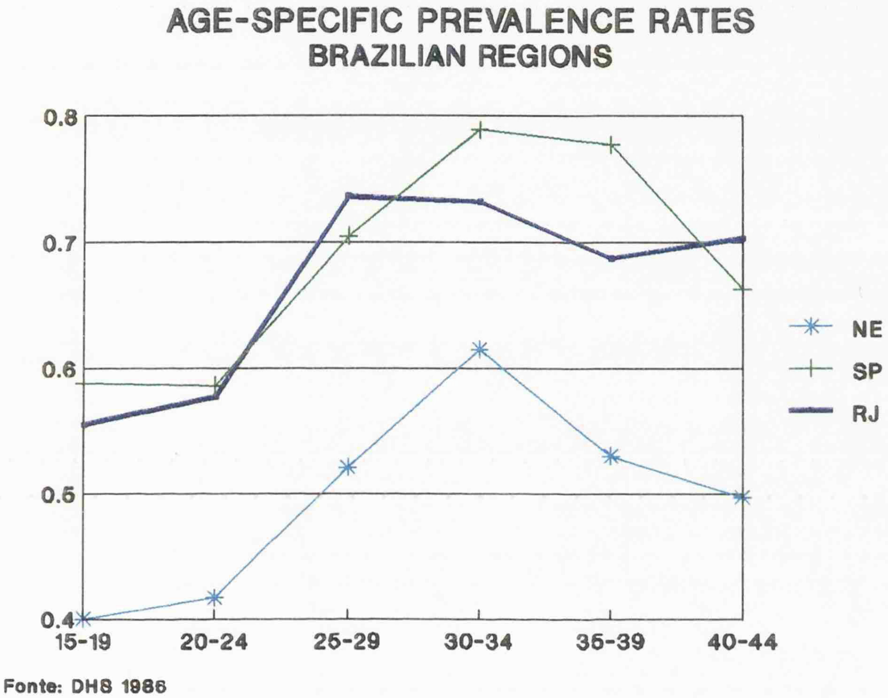

Figure 4.1

The choice of the method also varies with women's age. The analysis of mix of methods by age group presented here is restricted to pill and sterilization as small sample numbers do not allow an estimation of the percentage of women using other methods by age-groups. According to Figure 4.2, pill use decreases steadily with age in all regions. Rio de Janeiro women had the highest percentage among the pill users. On the other hand, age at sterilization increases with age up 30-34 years, except in São Paulo where the highest rate is found among women aged 25-29 years (see Figure 4.3). This indicates that this method was used as an alternative to the pill by older women in order to stop

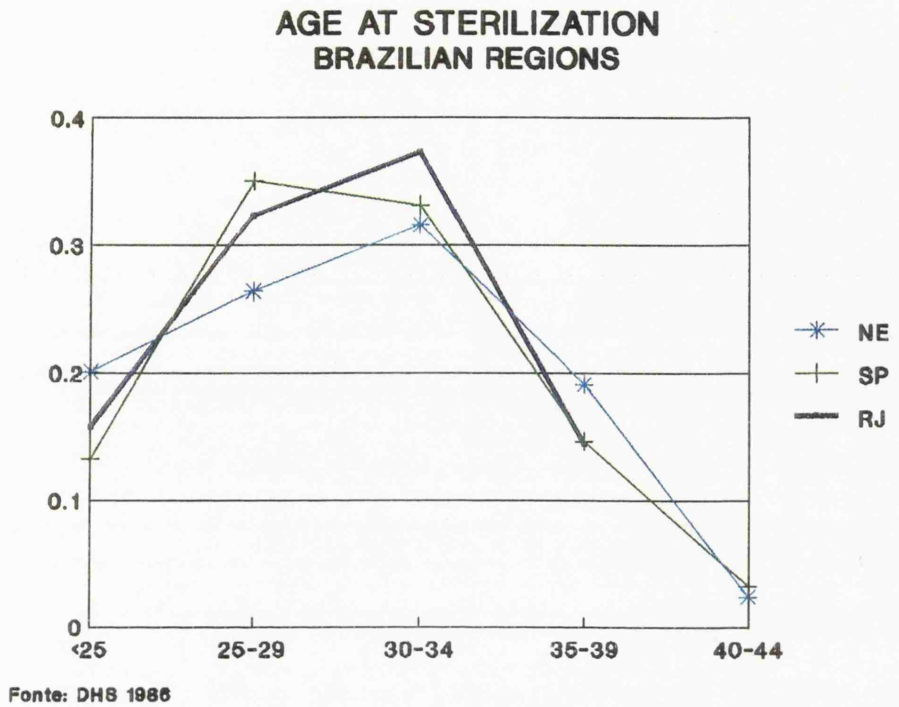

Figure 4.3

Sterilisation was the first method used by 82.9% of sterilized women in Rio de Janeiro. This percentage was even larger in São Paulo (83.4%) and the Northeast (85.3%). The results in terms of fertility outcome are different for women who used (or not) other methods before sterilization. Table 4.9 presents the mean parity of sterilized women controlled by previous method. The largest difference in fertility between the two groups is found in Rio de Janeiro. A Rio woman who did not used method before the sterilization ends childbearing with 0.7 more children than a woman who did. This difference was 0.6 in São Paulo and only 0.1 in the Northeast. It is clear that women who opted for sterilization as a first method did so after reaching the desired family size. It is likely that these women changed their mind about family size in a late stage of their life cycle. Hence, their fertility is higher than those who started contraception at an earlier stage.

Table 4.9
MEAN PARITY OF STERILIZED WOMEN BY PREVIOUS METHOD
Brazilian Regions

Regions	Previous	No Previous	N
Rio de Janeiro	2.6	3.3	156
São Paulo	3.0	3.6	144
Northeast	4.9	5.0	283

Source: 1986 DHS

As discussed in Chapter 1, it is assumed that fertility transition starts as a result of changes in values and attitudes by women at high parity. This is considered the first phase or the *control phase*. Contraceptives users are expected to have higher fertility than non users. It is expected that the reverse would happen in the second phase or in the *plan phase*. Table 4.10 displays the mean parity of married women aged 30-44[217] who had at least one child ever born[218] according to contraceptive use. Sterilized women are analyzed in a separate category. In Rio and São Paulo., sterilized women showed the highest mean parity. This suggests that women choose sterilization because they have already reached their desired family size. The difference on mean parity among the sterilized women indicate that in Rio women terminate childbearing through sterilization with 0.3 children less than in São Paulo.

[217] Small numbers prevented the calculation of this mean only for women aged 40-44 which should have completed their reproductive experience at the survey data. It is not unlikely that these conclusions are affected by the fact that apart from sterilized women the other have not completed their fertility experiences, yet. However, PNAD results analyzed by Morell (1994, pp 341-2) for São Paulo point to the same direction. Sterilized women and those who were making use of contraception exhibited the highest fertility. The mean parity of married women aged 45-49 years and in union for those contracepting was 0.8 children higher than for those who were not doing so (4.3 and 3.5). Sterilized women exhibited a much higher parity (5.1).

[218] It was considered women who had at least one child in order to eliminate part of the bias that would be produced by infecund women.

Table 4.10
MEAN PARITY OF EVER MARRIED WOMEN AGED 30-44 WHO HAD AT LEAST ONE CHILD BY CONTRACEPTIVE STATUS
Brazilian Regions

Regions	No Users	Users[1]	Sterilized
Rio de Janeiro	2.9	2.4	3.3
São Paulo	2.9	3.4	3.6
Northeast	6.3	5.0	5.5

Source: 1986 DHS
Note: [1] excluding sterilized women

The users of other methods had lower fertility than the non users in Rio (see Table 4.10). Fertility of contracepting women in Rio was much lower (almost one child less) than that of contracepting women in São Paulo. On the other hand, there was no difference in the fertility of non-contracepting women between these two areas. In the Northeast, the group of non-users women seems to be selective for higher fertility. However, sterilized women exhibited higher fertility than those using other methods.

Among current users parity is also an important variable in determining the prevalence of contraception and especially the mix of method. Pill users are more frequent at parity one except in the Northeast (see Figure 4.4). There, the highest percentage of users was found among women with three or more children (48.3%). In Rio, about 52% of users had no more than one child. The comparable percentage was 46% and 30% for São Paulo and the Northeast, respectively. The age specific sterilized rates increases with parity up to parity three in Rio de Janeiro and São Paulo (see Figure 4.5). The Northeast curve peaks twice: parity three and five. Actually, this rate jumped from parity four to five. Considering the cumulative percentages, about 71% and 63.5% of women living in Rio and São Paulo, respectively, were sterilized with a maximum of three children. In the Northeast, at this parity the comparable percentage was 36.2%. This increased to 47.0% at parity five.

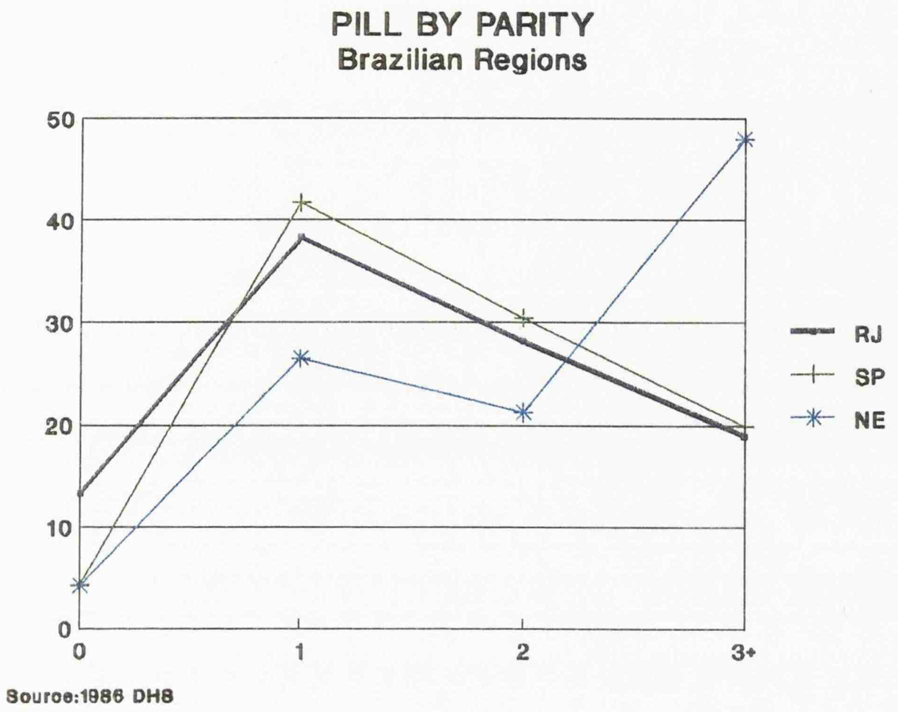

Figure 4.4

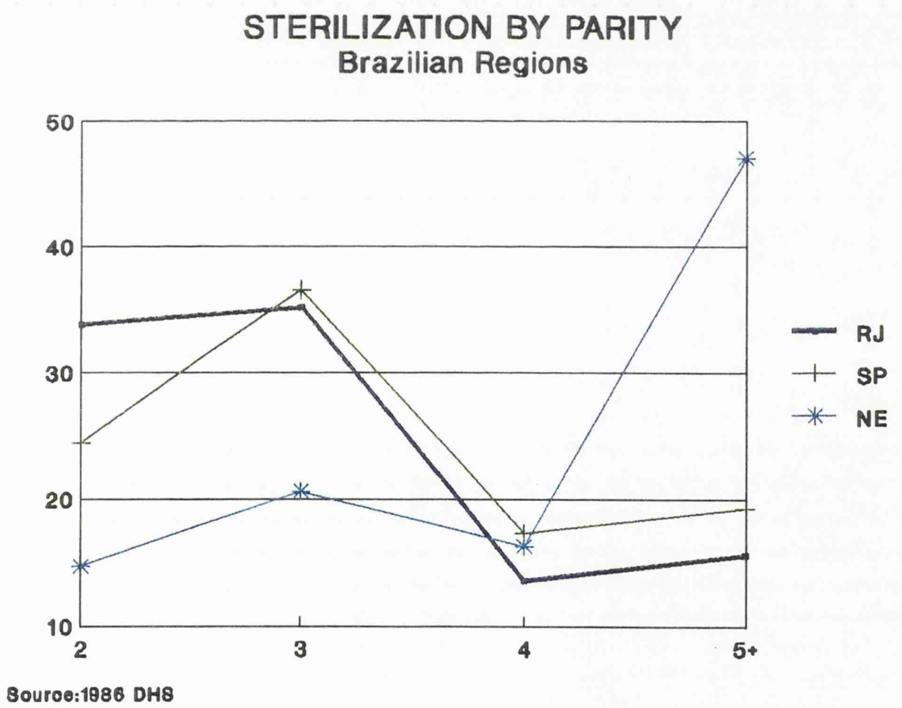

Figure 4.5

4.3.3 Parity at Starting Contraception

It was proposed in Chapter 1 that a second phase of fertility transition (*plan phase*) would be characterized by a widespread change in the value of small family size. This would result in attitudes towards smaller families being taken by women at earlier stages of their life cycle and would bring fertility down even more. Hence, the attention is turned here to the parity at first use of contraception, assuming that it tells more about women's contraceptive history than proportions of women currently using or who ever used a method. Information about first use allows the classification of women in three groups: *planners* if they started contracepting before the first child; *controllers* if they began after reaching the desired parity or at higher parity; and the residual composed of women who never contracepted.[219]

Information about first use by parity shows that for all the three regions most women started to use contraception before the first birth (see Figure 4.6). However, the magnitude of these percentages varied regionally. Rio exhibited the highest percentage of women who started contraception at parity zero, 51.4%; 15.4% higher than São Paulo and 152% higher than the Northeast. For women who started after the first child, São Paulo women had the highest percentage (29.0%) followed by Rio (25.9%). The highest percentage of starters at parities higher than two was found in the Northeast (34.1%). The CPS results for the Northeast[220] point to a large increase in the proportion of *planners* from 8.3% to 20.4% from 1980 to 1986.

[219] This typology was first proposed by Juarez and Lheras. They consider planner women those who started contracepting before the second birth. See: Juarez and Lheras (1993), p. 12.

[220] Figures presented by Badiani (1986), p 58.

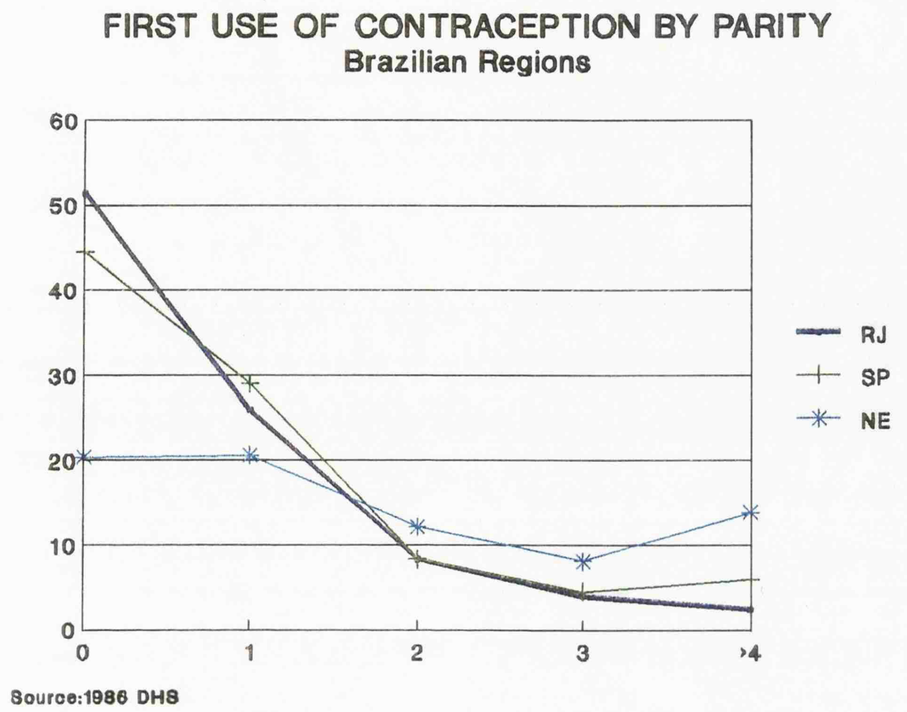

Figure 4.6

As will be seen in the following chapters, the progression to the third birth seem to be a watershed classifying old and new family building process. Also, the ideal mean family size estimated with DHS data was around two children. Hence, *controller women* will be defined here as women who started contraception after parity two. These percentages were 14.6%, 18.8% and 34.1% in Rio de Janeiro São Paulo and the Northeast, respectively. The residual group was composed of 9.1%, 11.3% and 24.9% in Rio de Janeiro São Paulo and the Northeast, respectively.

The effect of parity at the starting of contraception on fertility outcome can be seen in Table 4.11. It shows the total marital fertility rates in the last five years before the 1986 survey controlled by parity at starting contraception. This considers ever married women aged 20 and years over. The results point to a strong effect of parity at starting on fertility rates. This effect is on the expected direction and it is stronger the higher the fertility. For instance, Northeast women who had never been on method had 2.7 children more than those who started at parity zero. The range of variation was narrower in Rio de Janeiro and São Paulo (0.9 children) but it measures only the difference between *controller* and *planner* women. The fertility difference between the Northeast and the two other areas increases with parity at starting contraception. Those between Rio and São Paulo were kept constant.

Table 4.11
TOTAL MARITAL FERTILITY RATE BY PARITY AT STARTING CONTRACEPTION
Brazilian Regions

Parity	Rio de Janeiro	São Paulo	Northeast
0	2.9	3.3	4.7
1	3.3	3.8	5.1
2+	3.8	4.2	7.1
Never	xxx	xxx	7.4
Range	0.9	0.9	2.7

Source: 1986 DHS
Note: xxx Sample size < 30

4.4-THE POST-PARTUM NONSUSCEPTIBLE PERIOD

Deliveries are followed by a period of postpartum sterility due to the combined action of breastfeeding and prolonged sexual abstinence. In Brazil, as will be seen in section 4.4.2, sexual abstinence has not played an important role in the length of the post-partum nonsusceptible period. This has been basically determined by breastfeeding which has not also been very important. Thus the overall impact of this determinant in reducing fertility has been slight.

4.4.1- Data prior to 1986

Information about breastfeeding in Brazil before the 1986 DHS was collected only by the National Investigation of Human Reproduction and the CPS. This information was evaluated in terms of the Bongaarts indexes of post-partum infecundity and was considered consistent by Merrick and Berquó (1983)[221]. These data, displayed in Table

[221] See: Merrick and Berquó (1983), p 54.

4.12, show that the practice of breastfeeding was quite limited in Brazil. Although regional differences on this practice existed they are not large enough to explain regional differences on fertility.

Table 4.12
SUMMARY OF REPORTED MEASURES OF BREASTFEEDING
Brazilian Regions

SITE	Date	Breastfeeding	Amenorrhea	C_i
SÃO PAULO				
São José-urban	1975	6.0	3.8	0.9
Sertãozinho-rural	1975	7.3	4.4	0.9
São Paulo-urban	1978	1.0 (1)	2.0	1.0
São Paulo-rural	1978	7.4((1)	4.4	0.9
São Paulo-state	1978	2.3(1)	2.5	1.0
NORTHEAST				
Pe-capital(2)	1975	3.3	2.7	0.9
Parnaiba-urban	1975	4.8	3.3	0.9
Parnaiba-rural	1975	4.8	3.9	0.9
Piauí-capital	1979	3.3(1)	2.7	0.9
Piauí-rest	1979	9.1(1)	5.3	0.8
Bahia-capital	1980	4.8	2.9	0.9
Bahia-rest	1980	9.4	4.0	0.9
Pe-capital*(2)*	1980	3.7	2.2	1.0
Pe-rest*(2)*	1980	4.4	2.1	1.0
RGN-urban*(3)*	1980	4.2	2.5	1.0
RGN-rural*(3)*	1980	5.0	2.8	0.9
Paraiba-urban	1980	4.7	2.4	1.0
Paraiba-rural	1980	5.5	3.2	0.9
Northeast-total	1980	6.0	0.9	

Source: Apart from the total of São Paulo state and of the Northeast, all the information are from Merrick and Berquó (1983), p 55.
Note: *(1)* All the duration of breastfeeding are measured by the mean apart form those, which are measured by the median.
(2) Pe= Pernambuco
(3) RGN=Rio Grande do Norte
(4) The São Paulo total is a weighted average of the rural and urban published in Berquó et al (1985), p 55 and the Northeast total was published by Goldberg et al (1988), p 952.

The practice of breastfeeding was more intense in rural areas than in urban ones. The mean duration of breastfeeding ranged from 1.0 months in the urban areas of São Paulo to 9.4 in Bahia (Northeast), excluding the capital. This resulted in a range of variation for the median duration of amenorrhea from 2.0 months in São Paulo to 5.3

months in Piauí (Northeast), excluding the capital. A weighted average for the four Northeast states pointed to a mean duration of breastfeeding of 7.1 months and a mean duration of amenorrhea of 3.7 months.[222] The fertility inhibiting effect of breastfeeding, estimated by them, is also displayed in Table 4.12. The maximum effect was found in Piauí-state, excluding the capital, where 16% of fecundity was reduced by breastfeeding. The minimum impact was noticed in the urban areas of São Paulo where it was estimated at 3%. Although the inhibiting effect of this determinant works in the opposite direction of contraception and is stronger in the Northeast than in the two other areas, its value is not large enough to counterbalance the regional differentials in contraception.

4.4.2- The DHS Results

Information about the duration of the components of post-partum infecundity are based on the last child born. Estimates of the mean and median duration of breastfeeding, post-partum sexual abstinence and amenorrhea for the three regions are showed in Table 4.13. São Paulo women nursed their babies longer than those living in the other two areas; an average of 6.9 months which is 2.4 months longer than that observed in Rio de Janeiro and 1.6 months in the Northeast. This represents an increase of almost six months in the São Paulo median length of breastfeeding from 1978 to 1986 and changed the relative position of this area and the Northeast. According to this survey, São Paulo came to exhibit the longest breastfeeding duration.

[222] See Thomé (1988), p 916.

Table 4.13
MEAN DURATION OF THE COMPONENTS OF THE PERIOD OF POST-PARTUM INFECUNDITY (Months)
Brazilian Regions

Regions	Breastfeeding	Amenorrhea	Abstinence	$i^{(1)}$
Mean				
Rio de Janeiro	4.5	2.4	1.6	3.2
São Paulo	6.9	3.1	1.5	4.1
Northeast	5.5	3.0	1.4	3.6
Median				
Rio de Janeiro	3.0	1.0	1.0	2.6
São Paulo	6.0	2.0	1.0	3.7
Northeast	5.0	2.0	1.0	3.0

Source: 1986 DHS
Note: $^{(1)}$ i= mean duration of post-partum infecundability

It can be seen from Table 4.13 that ovulation resumed on average, three months after delivery in São Paulo and the Northeast and 2.4 months after delivery in Rio de Janeiro. Almost no regional variations are observed for sexual abstinence. Sexual activities restarted on average 1.5 months after delivery. The discrepancy between mean and median duration is worth noting as it indicates considerable variation and asymmetry in the distribution of duration. Table 4.14 shows the mean duration of breastfeeding by age groups. Average duration of breastfeeding varies with age; older mothers report longer periods. The first and last age groups are not considered for Rio and for São Paulo due to few small sample numbers.

Table 4.14
MEAN DURATION OF BREASTFEEDING BY AGE-GROUPS (Months)
Brazilian Regions 1986

Regions	Rio de Janeiro	São Paulo	Northeast
15-19	xxx	xxx	2.9
20-24	4.1	5.1	4.7
25-29	3.9	6.5	4.5
30-34	4.9	9.8	5.1
35-39	6.3	4.7	6.9
40-44	xxx	xxx	8.7

Source: 1986 DHS
Note: xxx means sample number >30

Although the mean duration of amenorrhea is known, the length of the period of post-partum infecundability was indirectely estimated using the Bongaarts equation, in order to make the estimates comparable with those obtained through CPS data. The Bongaarts equation is:

$$i = 1.753\exp(0.1396B - 0.001872\,B^2)$$

where i= mean duration of post-partum infecundability

and B= mean duration of breastfeeding.[223]

The results of this calculation can be seen in the last column of Table 4.13. On average, the length of post-partum infecundity ranged from 4.1 months in São Paulo to 3.2 in Rio de Janeiro. It was 3.6 months in the Northeast and thus did not play an important role in bringing fertility down or even in explaining fertility differentials. If the median is considered, the duration of the period of post-partum infecundity ranges from 3.6 to 2.6 months in São Paulo and Rio, respectively. This difference is about three months in the Northeast.

[223] See: Bongaarts (1982), p 188.

4.5-ABORTION

Although abortion has been forbidden in Brazil[224], its practice is believed to be widespread, especially among young and poor women. Questions on abortion have been asked in a number of fertility surveys undertaken in Brazil since the 1960s but there are no reliable data on abortion at a regional or a national level. According to Silva, whatever data do exist at that level tend to underreport the importance of abortion as a mean of fertility regulation.[225] Merrick and Berquó suggest a range of variation for the abortion rate of 0.5 to 1.5 per woman for Brazil as a whole in 1976.[226] The 1991 World Bank Report estimated a higher life time abortion rate of over two abortions per woman. [227]

4.5.1 Time-Period Trends

Some estimates are available for sub regions of the three regions studied here. These estimates are not disaggregated according to the kind of abortion, induced or spontaneous. Hutchison indicated that 9% of married women of reproductive age had experienced at least one abortion in Rio de Janeiro city in 1963.[228] A survey carried out in São Paulo city revealed that 18% of pregnancies ended in abortions of which one third were inducedBerquó estimates for certain regional contexts pointed to a range of variation for the total induced abortion rate from 0.735 in rural Parnaiba (Northeast) to 0.454 in rural Sertãozinho (SP) in 1975. She did not find a consistent rural urban pattern. Estimates based on CPS surveys indicate a lower abortion rate for São Paulo city in 1978 than in 1969.[229] This may suggest underreporting or a substitution of contraceptive for abortion as

[224] Abortions are allowed in Brazil only for pregnancies which are a result of rape or in case of risks to the mothers'life.

[225] See: Silva (1992), p 84.

[226] See: Merrick and Berquó (1983), p 54.

[227] Quoted by Martine (1995), p 7.

[228] See: Hutchison (1964), p 24.

[229] Quoted in Merrick and Berquó (1983), pp 50-3.

contraception rates increased during the period. The total abortion rate was estimated as 0.015 for the state as a whole in 1978 based on CPS data.[230] Abortion rates were lower in urban than in rural areas if abortion by women of reproductive age is considered. The direction of the differentials changes if abortions by pregnancies are taken into account. In the Northeast states, where the CPS was also carried out, the abortion rates ranged from 20.2% in the Pernambuco capital to 13.1% in the Piauí capital when abortion per woman at the reproductive age is considered.[231] In so far as the data can be trusted, abortion had a very small impact on fertility. Its inhibiting effect on fertility was estimated as 9.8% in São Paulo (1978) and 11% in the Northeast (1980).[232]

4.5.2 The DHS Results

Information about abortions disaggregated into spontaneous and induced categories were collected by the 1986 DHS. The calculation of total abortion rates is similar to total fertility rates and indicates the number of abortions a woman would have during her reproductive lifetime if current rates prevailed. Either annual age-specific abortion rates or the total number of abortions for women who have completed their reproductive career can be used to calculated this rate. Small sample size does not allow to break up annual abortions by age groups or the consideration of abortions reported by women aged 40-44. It is made here one attempt at estimating abortions rates considering abortions for all married women in the last five years before the 1986 DHS survey. The results are displayed in Table 4.15. From the point of view of the proximate determinants of fertility the main interest is in abortions within marriage. However, it is quite likely that a substantial proportion of abortions occurs outside marriage, affecting young single women.[233]

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[230] See Berquó et al (1985), pp 56-7.

[231] Quoted in Merrick and Berquó (1983), pp 52-3.

[232] See: Berquó et al (1985), pp 57-8 and Goldberg et al (1988), p 952.

[233] It was found by Silva in a middle class area of São Paulo in 1988 that about 22.3% of single women's pregnancies were deliberately stopped. The

The DHS results point to a much higher ratio for spontaneous abortion than for induced ones. This seems to be a result of misreporting. Considering both measures together, Northeast and Rio women experienced almost the same rate. If only spontaneous abortions are considered, Northeast women exhibited the highest percentage and if only induced ones are taken into account, the highest percentage is shown by Rio women. Very few São Paulo women reported induced abortions and this prevents the calculation of induced abortion rates.

Table 4.15
ABORTION RATES(1)
Brazilian Regions

Regions	Induced	Spontaneous	Total
Rio de Janeiro	0.210	0.246	0.456
São Paulo	xxx	0.269	0.327
Northeast	0.054	0.425	0.479

Source: 1986 DHS
Note: (1) mean number of abortions per current married women
xxx sample numbers < 30

4.6-OTHER FACTORS AFFECTING FECUNDITY

Although Bongaarts four main determinants are widely regarded as explaining most of the variation in fertility between populations, other factors do play a role. These additional elements are grouped together in his model within the estimates of "total fecundity". This is taken as an average of 15.3 children per woman but in practice varies from case to case. Bongaarts himself estimated that the total fertility rate of these women ranged from 13 to 17.[234] Many factors account for this relative low fecundity: infecundability, sterility, intra-uterine mortality and coital frequency. Some hints of the roles played by a number of these fecundity factors can be assessed for the three regions.

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comparable percentage for married women was 3.8%. Approximately 78% of single women's abortions happened during their first pregnancy. The percentage was 11.1% for married women. Her results refer to a group of middle class women, higher educated than the state's average and with lower fertility. See: Silva (1992), pp 103-4.

[234] See: Bongaarts (1982), p 180.

4.6.1-Childless Women

The net effect of primary sterility and intrauterine mortality is reflected in the percentage of ever married women childless at a certain age. Table 4.16 displays these percentages for ever-married childless women aged 30-39, 40-49 and 50-59 according to the 1940, 1970 and 1980 Demographic Censuses. Information from the 1950 and 1960 Censuses were not considered due to the lack of disaggregation of the number of children into children born alive and stillbirths. It may be seen that the percentage of childless women decreased in all regions during the period as expected in response to improvements in health conditions. Rio women exhibited the highest percentage of childlessness throughout all period while São Paulo women had the lowest childless rate. Among women aged 30-39 years who are more responsible for current fertility changes, the decline was more marked in Rio de Janeiro between 1940 and 1970. During 1970-80, this was more marked in the Northeast which might explain part of the fertility increase observed there in the 1940s and 1950s .

Table 4.16
PERCENTAGE OF EVER MARRIED CHILDLESS WOMEN BY AGE-GROUP
Brazilian Regions

Regions	30-39	40-49	50-59
1940			
Rio de Janeiro	12.7	11.8	12.0
São Paulo	8.0	7.1	7.2
Northeast	8.2	8.0	8.9
1970			
Rio de Janeiro	7.3	8.2	10.0
São Paulo	5.2	5.6	6.7
Northeast	5.5	5.7	6.7
1980			
Rio de Janeiro	5.2	4.5	6.2
São Paulo	4.0	3.2	4.4
Northeast	3.0	3.4	5.6

Source: 1940, 1970 and 1980 Demographic Censuses

The reduction in the percentage of childless women was quite marked in São Paulo as well. Berquó and Gomes noticed an increase of syphilis in the municipality of São Paulo between 1928 and 1945 which paralleled some of this fertility decline.[235] On the other hand, the fertility increase observed there coincided with the introduction of antibiotics in Brazil and with the reduction in the incidence of this disease. It is likely that syphilis and other venereal diseases played some role in women's health and their fertility in São Paulo at that time and in the other regions as well.

The regional differences in this indicator are marked especially when comparing Rio and São Paulo in 1940. These probably explain part of the regional differences in fertility. One attempt at measuring the impact of time-period and regional variations in the percentage of childlessness in fertility is displayed in Table 4.17. Total fertility rates are calculated, termed here total fecundity rates, considering women who had at least one child in the denominator instead of all women. They are also compared with the conventional TFRs.

Table 4.17
TOTAL FECUNDITY RATES (FRs) AND TOTAL FERTILITY RATES BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro		São Paulo		Northeast	
	FR	TFR	FR	TFR	FR	TFR
1930-35	5.0	4.4	5.8	5.7	7.2	6.7
1940-45	4.5	3.8	5.1	4.9	7.1	6.9
1950-55	4.3	3.8	4.4	4.1	7.4	7.2
1960-65	4.5	4.4	4.7	4.6	7.5	7.4
1970-75	3.5	3.3	3.7	3.7	7.0	6.8

Source: 1940, 1970 and 1980 Demographic Censuses

The largest relative effect of childlessness seems to had been experienced by Rio women. This was also expected as these women exhibited the largest percentage of childlessness. The fecundity rate trends are similar to those shown by fertility rates. The

[235] See: Berquó and Gomes (1986), p 127.

simulation suggests that the reduction in the percentage of childlessness did not greatly affect the fertility trends analyzed in Chapter 3. This seems to have prevented some fertility decline in the 1940s in Rio. Its TFR was stable at that time; around 3.8 in 1940-45 and 1950-55 and the total fecundity rate declined slightly from 4.5 to 4.3. It is also likely that reduction in childlessness was partially responsible for the increase in total fertility rates observed there in the 1950s (15%). Although fecundity rate increased, this was lower (5.3%) than the increase observed in fertility. Similar trend was observed in São Paulo.

The regional differences are reduced if fecundity is considered instead of fertility, especially in the three early quinquennia (see Table 4.18). This compares the coefficient of variation for fecundity and fertility measures. Both of them take Rio rates as a measure of comparison. The comparison suggests that part of the regional fertility differences might be caused by differences in the percentage of childless women. However, most of the differences seem to be caused by fertility.

Table 4.18
COEFFICIENT OF VARIATION BY TIME PERIOD (%)
Brazilian Regions

Time-Period	Fecundity	Fertility
1930-35	19.6	26.4
1940-55	27.9	40.9
1950-55	36.1	44.8
1960-65	34.6	35.3
1970-75	53.9	56.8

Source: Table 4.17

4.6.2 Secondary Sterility

Efforts in order to get information about secondary sterility or subfecundity in Brazil have been carried out by the DHS survey and by a PNAD special survey. Both were taken in 1986 and recorded information about women of reproductive age who were trying to get pregnant in the last three years but without success. Nevertheless, the DHS sample is too small for allowing some measuring in this matter for these areas. The 1986

PNAD indicated that Rio and Northeast women had the same percentage of sub-fecund women (5.9%) and this was slightly higher than that observed in São Paulo (5.6%). These percentages are calculated in relation to all women aged 15-54. Although these data are not disaggregated by age groups it does not seem likely that subfecundity could markedly affect fertility especially in view of the observed regional differences.

4.6.3 Intra-uterine Mortality

Intrauterine mortality is defined as being miscarriages and stillbirths. The distinction between them is made on the basis of the time of gestation. The former includes foetal wastage up the sixth month and the latter deaths after the seventh month. Brazilian data about stillbirths were collected in the 1940, 1970 and 1980 Demographic Censuses. Although they might be flawed due to misclassification of still births and neo-natal deaths, the time-period trends and regional differentials point in the expected direction. Table 4.19 shows the percentage of stillbirths in the number of total births to women aged 30-39, 40-49 and 50-59 years in these censuses.

Table 4.19
PERCENTAGE OF STILL BIRTHS AMONG ALL BIRTHS BY WOMEN'S AGE-GROUP AND TIME PERIOD
Brazilian Regions

Time Period	30-39	40-49	50-59
1940			
Rio de Janeiro	8.2	9.1	9.7
São Paulo	7.1	7.7	7.9
Northeast	4.6	5.3	8.3
1970			
Rio de Janeiro	2.3	3.1	3.5
São Paulo	2.6	3.3	3.6
Northeast	3.8	4.7	5.2
1980			
Rio de Janeiro	5.0	6.1	6.9
São Paulo	4.9	5.8	6.7
Northeast	3.4	4.3	8.1

Source: 1940, 1970 and 1980 Demographic Censuses

The figures in Table 4.19 point to a decline in the percentage of stillbirths from 1940 to 1970 as expected due to improvements in living conditions. However, this percentage is still very high. A substantial increase was observed in the 1970s. This was analyzed by Brazilian demographers and appears to be associated with a misreporting of neo-natal deaths as stillbirths. It seems also that foetal wastage was counted as stillbirth.[236] Rio de Janeiro women showed the highest percentage of stillbirths apart from 1970. In this years, the highest percentage was exhibited by Northeast women. The lowest percentage was observed in São Paulo in all time periods and age groups.

Another simulation is shown in Table 4.20 which aims to isolate the impact of regional differences in stillbirths on fertility variation. Total fertility rates were calculated counting stillbirths as live births. The effect was more marked in the 1930s in all areas due to the highest percentage of stillbirths observed at that time. Apart from 1960-65, this was more marked in Rio de Janeiro. Although the direction of regional trends was not affected, the reduction in the proportion of stillbirths in the 1940s and 1950s prevented fertility

[236] See for instance, Bercovich (1985).

decline in Rio and reduced its intensity in São Paulo. The comparison of Rio total fertility rate between 1930-35 and 1960-65 suggests no time variation but the simulated rates indicate a reduction from 4.8 to 4.5. São Paulo TFRs point to a reduction of 19% in fertility while the simulated rates indicates a reduction of 24%. Fertility increased in the Northeast at that time by 9.8%. This does not seem to be overly due to the reduction in the proportion of stillbirths as the simulated rate increased by 10.4%. Table 4.21 shows the simulated regional differences in fertility as measured by the coefficient of variation. The comparison of these with those calculated for the observed rates suggests that regional differences in the proportion of women with stillbirths did not greatly affect regional differences. They would have been slightly reduced if there were no stillbirths.

Table 4.20
TOTAL FERTILITY RATES ASSUMING NO STILLBIRTHS (SB) BY TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro		São Paulo		Northeast	
	No SB	TFR	No SB	TFR	No SB	TFR
1930-35	4.8	4.4	6.2	5.7	7.1	6.7
1960-65	4.5	4.4	4.7	4.6	7.8	7.4
1970-75	3.6	3.3	3.9	3.7	7.0	6.8

Source: 1940, 1970 and 1980 Demographic Censuses
Note: SB= Stillbirth

Summarizing, the analysis of a number of the determinants that affect fecundity showed that childlessness and stillbirth have inhibited fertility. This was regionally and intertemporally differentiated. It suggests that childlessness and proportions of stillbirth declined over time and exhibited regional differences. Part of regional differences in fertility seem to be caused by fecundity but it did not affect the fertility trends. Unfortunately regional differences in coital frequency could nor be assesed.

4.7-THE IMPACT OF THE PROXIMATE DETERMINANTS ON FERTILITY RATES

The Bongaarts method for estimating proximate determinants allows one to link the total fertility rate to the total fecundity rate using estimates of contraception, abortion, post-partum amenorrhea and marriage rates. As seen before, it is possible to estimate the full set of indexes for the three regions only for 1986. Before this year, it is possible to estimate only C_m, the marriage index. Based on C_m, some inferences about the contribution of the proximate determinants on fertility time period changes and regional differences are made for the first quinquennia of each decade comprised between 1930 and 1980. CPS results for 1978 and 1980 allow the calculation of the full set of Bongaarts indexes for São Paulo and the Northeast.

Table 4.21
COEFFICIENT OF VARIATION BY TIME PERIOD (%)
Brazilian Regions

Time-Period	No Still Birth	Observed Fertility
1930-35	22.2	26.4
1960-65	34.4	35.3
1970-75	52.2	56.8

Source: Table 4.21

4.7.1 The Effects of Some Proximate Determinants on Fertility: time period trends

The Bongaarts indexes of marriage C_m are estimated for the same time periods that total fertility rates and total marital fertility rates were calculated, that is the quinquennia 1930-35, 1940-45, 1950-55, 1960-65, 1970-75 and 1980-85, in Chapter 3. Assuming these rates and the C_m, an index labelled C_{other} is estimated in order to measure the impact of *the other* proximate determinants on fertility time period changes and on regional differences. A total fecundity rate of 15.3 is assumed. Figures 4.7 and 4.8 display the results.

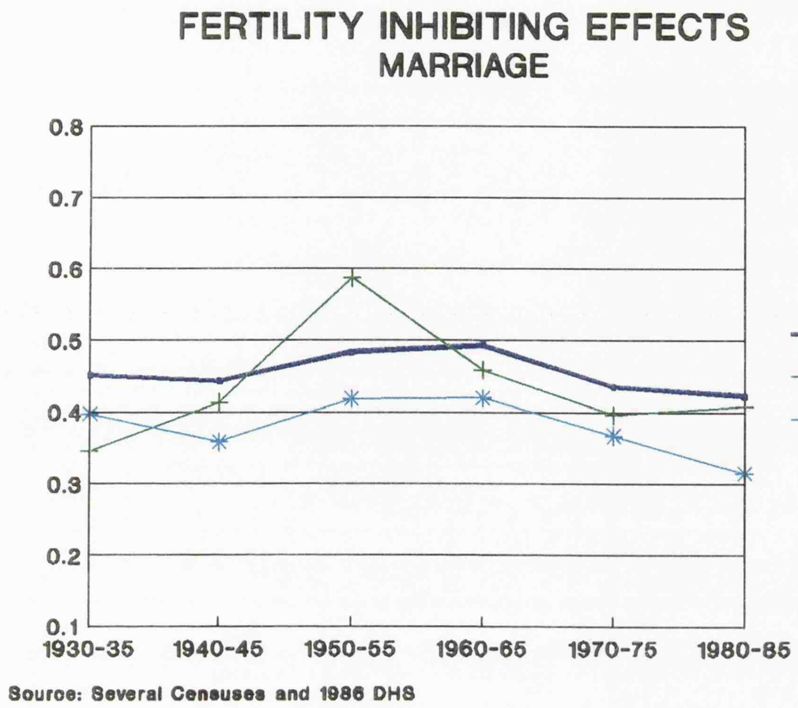


Figure 4.7

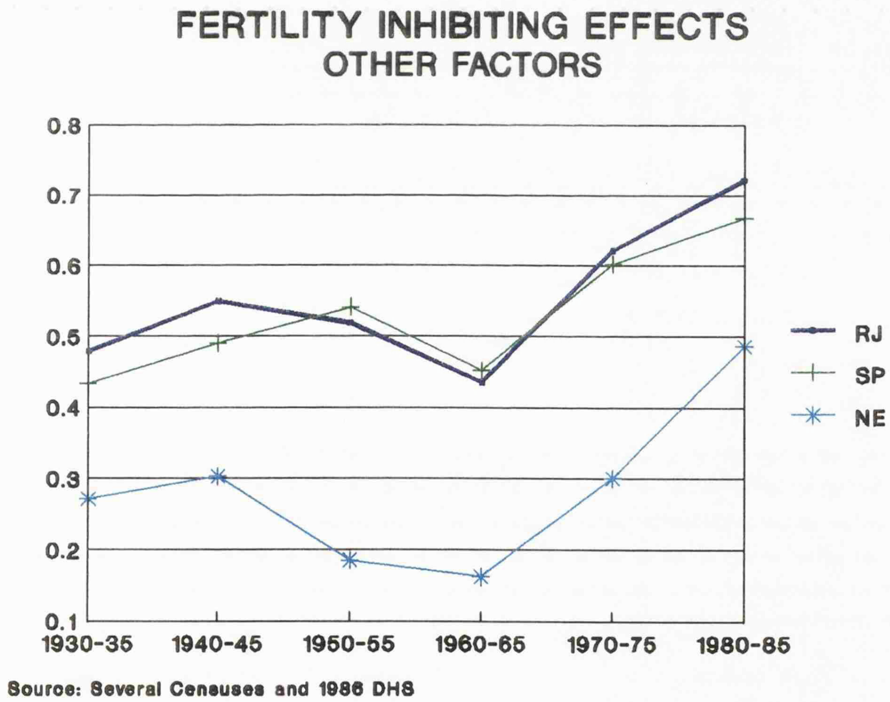


Figure 4.8

According to the two figures, since 1930-35 most of Rio and São Paulo fertility rates have been explained by *the other* factors, probably by contraception.[237] Their importance increased over the period. In Rio, the increase in C_{other} during the 1940s resulted in fertility decline. This seems to be a consequence of more intentional fertility control.[238] The influence of these factors declined there during the late 1940s and 1950s and this explained the fertility increase observed during the 1950s.[239] Less nuptiality, measured by the increase in C_m prevented fertility rise in the 1950s and inhibited more increase in the following decade. See Table 4.22 which shows a comparison between the total observed fertility rates and an estimate of the expected rates in the case of no time period changes in C_m. Only in 1960-65 was the impact of nuptiality more important than that produced by the *other* factors. An increase in nuptiality during the late 1960s prevented further fertility decline due to more fertility control. Since then the importance of *the other* factors increased again and in 1980-85 its effect was twice as large as that produced by nuptiality.

[237] Given the low estimates of breastfeeding and abortion it is probably fair to view *Cother* as mostly reflecting the use of contraception.

[238] This is consistent with the increase observed in the Coale Trussell index (m) in Chapter 3.

[239] This is also consistent with the observed reduction in the Coale-Trussell index (m) in Chapter 3.

Table 4.22
TOTAL FERTILITY RATES, OBSERVED AND EXPECTED
BASIS= Previous Period
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
1940-45			
Observed	3.8	4.8	6.8
Expected	3.8	5.1	6.4
1950-55			
Observed	3.8	4.1	7.2
Expected	4.1	4.4	8.0
1960-65			
Observed	4.4	4.5	7.4
Expected	4.5	4.9	7.5
1970-75			
Observed	3.3	3.7	6.3
Expected	2.9	3.3	6.2
1980-85			
Observed	2.2	2.6	5.1
Expected	2.2	2.6	5.2

Source: Several Demographic Censuses and 1986 DHS

High nuptiality was partially responsible for keeping São Paulo fertility relatively high in most quinquennia (see Figure 4.7 and Table 4.22). Its inhibiting effect was more important in 1960-65 when, as in Rio de Janeiro, nuptiality decline indicated by lower C_m prevented a more marked fertility rise caused by less fertility control. However, its increase prevented further fertility decline in the 1970s. The *other* factors played a much more important role in inhibiting fertility except in 1960-65 in Rio de Janeiro (see Figure 4.8).

Nuptiality increased in the Northeast during most of the period except in the 1940s and 1950s (see Figure 4.7 and Table 4.22). In 1930-35, nuptiality was lower there than in São Paulo and prevented the total fertility rate from being even higher. The fertility increase observed in 1940-45 seems to be a result of more nuptiality as C_{other} increased. On the other hand, the subsequent fertility growth in 1950-55 and 1960-65 was a result of decline in C_{other}. Nuptiality reduction prevented further increases as in Rio and São Paulo. The inhibiting impact of the *other* factors was quite low until 1970-75. These factors came to be more important than nuptiality only in 1980-85.

4.6.2 Comparisons Using CPS Data

As mentioned before, the full set of Bongaarts indexes can be calculated for São Paulo in 1978[240] and for the Northeast in 1980.[241] They are shown in Table 4.23. These results stress the large regional differences in contraceptive prevalence in the two areas. This explains 79% of the differences in their total fertility rates. Contraception inhibited almost 60% of the natural marital fertility in São Paulo and 35% of it in the Northeast. In the latter area, marriage played the most important inhibiting effect on fertility levels (41%) at that time. Breastfeeding and abortion did not show clear regional differences in absolute values but they are quite marked when relative differences are considered.

Table 4.23
ESTIMATES OF THE INHIBITING EFFECTS ON THE PROXIMATE DETERMINANTS OF TOTAL FERTILITY RATES
São Paulo and the Northeast

Determinants	São Paulo(1) 1978	Northeast(2) 1980
Total Fecundity	15.3	16.1
Marriage	0.423	0.410
Breastfeeding	0.050	0.110
Contraception	0.607	0.350
Abortion	0.098	0.010
Total Fertility	3.2	5.4

Source: (1) Berquó et al (1985), p 58
(2) Goldberg et al (1988), p 952

240 Apart from C_c, the São Paulo indexes displayed in this table were calculated by Berquó et al (1985), p 58. C_c is calculated using the proportion of users published by Berquó but the measures of efficacy are the same as those used for 1986 which are shown in Table 4.8.

241 See Goldberg et al (1988), p 952.

4.6.3 The 1986 DHS Results

The contribution of the proximate determinants on the fertility rates is calculated using the method proposed by Casterline et al (1984).[242] The main advantage of this method is that it considers the age specific distribution of contraceptive use and breastfeeding. The index of marriage, $C_{m,}$ is based on direct estimates of age-specific marital fertility. An initial TF (fecundity rate) of 15.3 is assumed for all regions. Figure 4.9 shows the results. The regional differences in marriage rates were not large enough to explain the fertility differences. The inhibiting effect of marriage ranged from 42.2% in Rio de Janeiro to 35.5% in the Northeast. Almost no difference was found between Rio de Janeiro and São Paulo C_m (40.8%). Contraception was the most important determinant of fertility levels in all regions and of the regional differences. It reduced 68.7% of the São Paulo marital fertility, 65.7% of the Rio de Janeiro and 50.6% of the Northeast's. Differences in contraceptive prevalence explained 73% of the differences between the Northeast and Rio de Janeiro fertility and 80% of those between the Northeast and São Paulo.

The comparison of Bongaarts indexes between 1980 and 1986 indicates a reduction of the inhibiting effect of marriage from 42.3% to 40.8% in São Paulo and from 41% to 35.5% in the Northeast. This prevented further fertility decline in both areas as previously seen in Figure 4.9. Contraception's effect increased in both areas and more than counterbalanced nuptiality's rise. This increase was much more important in the Northeast (39%). For São Paulo the comparable change was 7.2%.

The other two determinants did not play an important role in inhibiting fertility. Table 4.23 displays the estimates of the Bongaarts indexes of post-partum insusceptibility used in Figure 4.9. They are based on the age-specific mean duration of breastfeeding. The highest effect was experienced by São Paulo women who had their fertility reduced by 10%. The lowest impact was on Rio women (6.6%). In the Northeast the reduction provoked by breastfeeding is estimated as 8.5%. This table also shows the abortion indexed considered in Figure 4.9. It is assumed that part of reported spontaneous abortions

[242] See: Casterline et al (1984), pp 49-50.

were in fact induced. Abortion reduced 9.2% of the Rio women's total fertility, about 4% in São Paulo and 3% of total fertility in the Northeast.

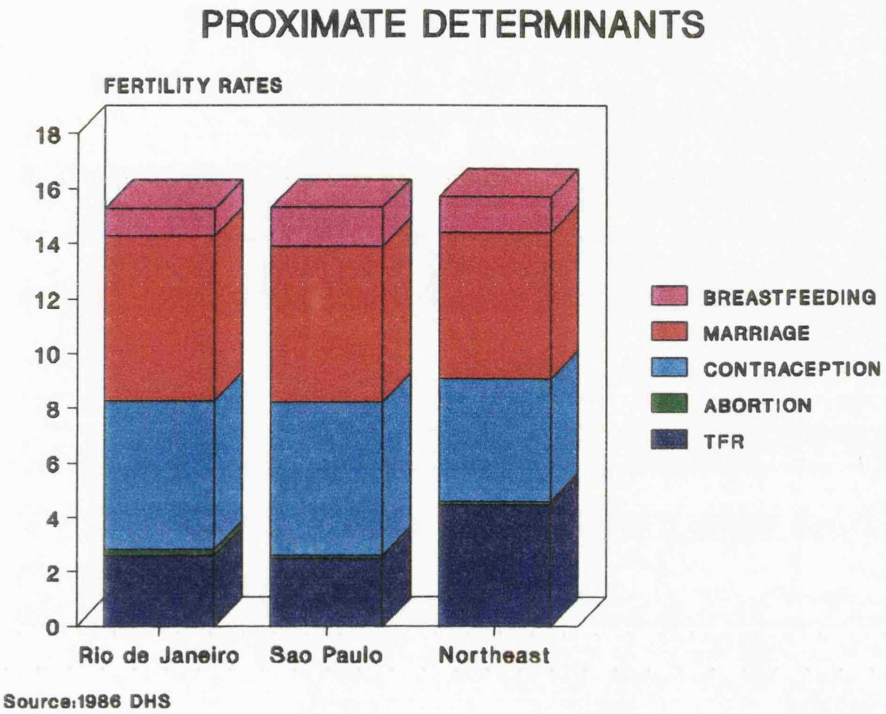


Figure 4.9

Table 4.23
BONGAARTS INDEXES OF POST-PARTUM NON SUSCEPTIBLE PERIOD AND ABORTION
Brazilian Regions

Regions	Pos-partum	Abortion
Rio de Janeiro	0.934	0.908
São Paulo	0.908	0.960
Northeast	0.915	0.969

Source: 1986 DHS

Table 4.23 compares the total fertility rates estimated by conventional procedure and those estimated by the model of proximate determinants. The best fit of the model was found in São Paulo. The Rio TFR estimated by the model was 15% higher than the conventional one. The traditional explanation for this difference are high levels of induced abortion, high levels of natural sterility, reduced coital frequency and unusually high fertility inhibiting effects of other proximate determinants. The difference between the two rates in the Northeast was 17% and it was in the reverse direction. In the Northeast, this figure might reflect misreporting of marital status or high unwed fertility. Curtis and Diamond also found out an excess fertility of 1.6 children in the Northeast. They attributed this excess to lags effects of recent increases in contraceptive use and relatively low fertility inhibiting effect of breastfeeding. Contraception prevalence rates used here refer to the current status and the TFRs were estimated based on births occurred in 1980-85. As contraception prevalence increased substantially in the Northeast in the early 1980s period, the 1986 estimate of prevalence is higher than the level of contraceptive use experienced over 1980-85 on which the TFR is based. Adjusting for this lag effect, Curtis and Diamond could reduced from 1.6 to 1.0 the fertility excess.[243]

Table 4.24
TOTAL FERTILITY AND FECUNDITY RATES
Brazilian Regions

Regions	Conventional TFR	Model TFR	FR
Rio de Janeiro	2.2	2.6	13.4
São Paulo	2.7	2.5	17.1
Northeast	5.1	4.2	17.1

Source: 1986 DHS

Another variable analyzed here is fecundability. Turning the procedure of estimating fertility rates around, total fecundity rates (TF) are estimated. They are displayed in Table 4.24, suggesting TF values of around 13 in Rio and 17 in São Paulo and the Northeast. It is not possible to known if these apparent variations in fecundity are genuine or an indication of problems with data or methodology. However, some hints of changes and regional differences were found in some other contributors to fecundity rates, notably primary sterility and stillbirths. Fecundity in Rio seems to be lower than in other regions.

[243] See Curtis and Diamond (1994), pp 8-10.

Although the procedure here used has improved the understanding of the relative importance on fertility of the different proximate determinants, it must be kept in mind, however, that the disaggregation of the components of fertility should not be regarded as an end in itself. A woman's completed fertility is the end product of a reproductive lifetime of interrelated events and experiences, not the sum of a series of unrelated issues. Most of the measures of proximate determinants used here are related to current status and fertility rates are based on women's experience in the five years before the survey.

4.8 SUMMARY

The objective of this chapter was to evaluate the impact of the proximate determinants on regional fertility decline and on its differentials. It showed that contraceptive strategies played the most important role in bringing fertility down in all three areas and they explain most of the regional differences. Sterilization was the most used contraceptive method in recent years. Variations over time in marriage patterns cannot be made responsible for most of the changes in reproductive behaviour. Indeed, more recent alterations in nuptiality such as the increase in the late 1970s and early 1980s operated in the direction of preventing further fertility decline. The other proximate determinants, breastfeeding and abortion, did not play a major role. Although these are the general trends the regional differences are quite marked.

Contraception seems to have been part of Rio de Janeiro women's lives since the 1930s. Its importance increased over time but not steadily. Marital fertility increased from the late 1940s to the early 1960s. Although an increase of effective fecundity seems to have occurred, there is some evidence that fertility control was less practised there at that time. Lower nuptiality inhibited fertility rise in the late 1940s and its further growth in the following decade. It was also responsible for keeping Rio de Janeiro fertility lower than São Paulo in the 1950s, 1960s and 1970s. A growth in contraceptive use resumed in the late 1960s and accelerated fertility decline. An increase in nuptiality reduced the pace of the fertility decline.

São Paulo fertility rates were relatively high in the past as a result of higher nuptiality, less fertility control and more fecundity. Fertility declined as a result of more contraception which partially inhibited the nuptiality increase that took place during 1930-55. As in Rio, contraception use declined in the following decade and led to a rise in fertility. Since then, contraceptive use has increased and has resulted in a dramatic decline in fertility.

In 1986, Rio women married slightly less than São Paulo women and contracepted slightly less as well. There are some indications that differences between these two areas might be explained by differences in fecundity. Nevertheless, Rio women, especially those contracepting showed different reproductive strategies than those in São Paulo. They married later and started contracepting at an earlier stage of their reproductive cycle. It was also seen that parity at starting contraception played an important role on fertility outcome.

Although contraceptive use was very low in the Northeast until the 1960s, relatively low nuptiality and possibly lower fecundity prevented fertility from being even higher. In 1930-35, nuptiality was lower there than in São Paulo. The fertility increase observed in 1940-45 seems to be a result of more nuptiality. On the other hand, the following fertility increases in 1950-55 and 1960-65 were a result of declines in C_{other}, especially in 1950-55. Contraceptive use increased dramatically there, the percentage of users rose from 37% to 53.2% from 1980 to 1986. The increase of contraception efficacy was also important and it was a result of an increase in the percentage of sterilized women. As prevalence increased substantially in this area in the early 1980s, its effect was not quite reflected in the total fertility rates. This suggests that independently of a new rise in prevalence, total fertility rates will continue to decline in the near future.

These findings suggests that although contraceptive prevalence is an important factor in reducing fertility, its effect tends to decline at advanced stages of fertility transition. This implies that others strategies should be taken into account, especially the contraception history. Considering this and the data availability, it was proposed here a women's classification according to their timing at starting contraception. By timing it is considered parity. Women were classified in three groups: *planners* if they started contracepting before the first child; *controllers* if they began after reaching the desired parity which is assumed to be two and the *residual* composed of women who never contracepted.

Chapter 5

SOCIO-ECONOMIC DIFFERENTIALS IN FERTILITY TRENDS

5.1-INTRODUCTION

The evidence presented in Chapter 3 indicated that fertility was already declining in Rio de Janeiro in the 1930s and then fertility decline had spread to the rest of the regions. Differences within regions in some of the socio-economic variables that are closely associated with fertility, per capita income, urbanization and education narrowed in such a way as to promote fertility decline in all areas. Nevertheless, in 1986 there were still some important regional disparities. It is reasonable to expect that the large socio-economic and regional differences in Brazil will explain at least part of the fertility differences among the three study areas.

The objective of this chapter is to analyze fertility trends by residence, migration status, ethnicity, income, education and women's current working status. It is expected a reduction in fertility differentials by socio-economic variables if the diffusion effect works. The chapter also assesses the relative contribution of changes in socio-economic variables to fertility decline and addresses the question of whether regional fertility differences would remain under equivalent socio-economic conditions.

As mentioned in Chapter 1, the first difficulty faced in analyzing fertility trends by socio-economic variables is the lack of information which would allow the measurement of complete fertility cohorts and time-period series for all variables. Cross-tabulation relating fertility data with socio-economic variables are irregularly published in demographic censuses and most published tabulations are not disaggregated by age-group. Consequently, published estimates based on special census tabulations are also considered in this analysis. The second problem is related to the small size of the DHS sample when disaggregations by socio-economic variables are carried out. In this case and when information is missing, such as for ethnicity and income, the 1986 General Household Survey data (PNAD) are used. The third difficulty refers to the diversity of criteria that have been employed for the establishment of informant's ethnic group or socio-economic status in the various censuses and surveys. This makes time-period comparisons difficult.

This chapter is divided into eight sections, being this introduction the first one. Section 5.2 analyses trends in fertility by current residence. Fertility differences by migration status is considered in sections 5.3. Section 5.4 examines fertility movements by ethnic groups. Fertility differentials by per capita income, education and women's current working status are analyzed in sections 5.5, 5.6 and 5.7 respectively. The last section summarizes the main findings.

5.2-FERTILITY TRENDS BY RESIDENCE

5.2.1 What is Known?

Mortara measured the influence of urbanization on fertility of the Brazilian states using the 1940 census data. According to him, the ten states with the highest fertility rates had, on average, about 88% of their population living in rural areas. For the other 10 states with the lowest fertility, this percentage was 82.7%. He attributed lower urban fertility to later marriage, lower proportion of fecund women and more fertility control.[265]

Saunders research, based on the 1920, 1940 and 1950 censuses, highlighted the constant presence of rural-urban fertility differentials in Brazil. However, this varied in magnitude and importance over the entire area.[266] He calculated child-woman ratios, the ratio between children aged less than five years to women aged 15-49, by residence, for all Brazilian states using the 1920 and 1940 census data. Crosstabulations of age by residence categories were not provided until the 1950 census. However, he considered the

[265] See: Mortara (1954), pp 422-4.

[266] See Saunders (1958), p 18.

population living in the capitals of the states as urban[267] and the population of the rest of the state as rural. His results for the three study areas are shown in Table 5.1. They refer to 1915-20 and 1935-40. The use of these measures for comparing fertility trends might affect any conclusions as child women ratios are affected by age distribution and by childhood mortality also. Urban fertility was much lower than rural fertility in all areas. Urban fertility declined from one period to another in Rio de Janeiro and São Paulo. Rural fertility increased in Rio de Janeiro and the Northeast and decreased in São Paulo. São Paulo had lower fertility ratios in both residence categories in 1935-40. Fertility increased in the Northeast urban area since this area exhibited very low values in 1915-20.

Table 5.1
CHILD WOMAN RATIO FOR THE CAPITALS OF THE STATES AND THE REST OF THE REGION BY TIME PERIOD (Per 100)
Brazilian Regions

Regions	1915-20		1935-40	
	Capital	Rest	Capital	Rest
Rio de Janeiro[(1)]	41.0	65.2	37.0	68.0
São Paulo	46.0	70.0	34.8	66.2
Northeast[(1)]	34.3	59.7	40.6	69.1

Source: Saunders (1958), p 32
Note: [(1)] Weighted average according to both categories of population in each state

5.2.2 Fertility Differences

The first attempt at measuring fertility differences by residence is shown in Figures 5.1 and 5.2. They present total fertility rates of the cohorts born in the quinquennia from 1900-05 to 1960-65. They refer, respectively, to urban and rural areas. These estimates use the synthetic cohort method proposed by Brass (1985), already utilized in Chapter 3. The data used might be affected by migration and recall errors as previously mentioned. However, most of the migration occurring in the period was from rural to urban areas and from the Northeast to Rio and São Paulo. This might have

[267] The capital city of each state was definitely in all regions the largest urban centre of the state. The range in size from the capital city to the next urban centre was considerable in most of states.

provoked an increase in fertility in the immigration areas and reduced residence and regional differences. But this does not affect the conclusions drawn here.

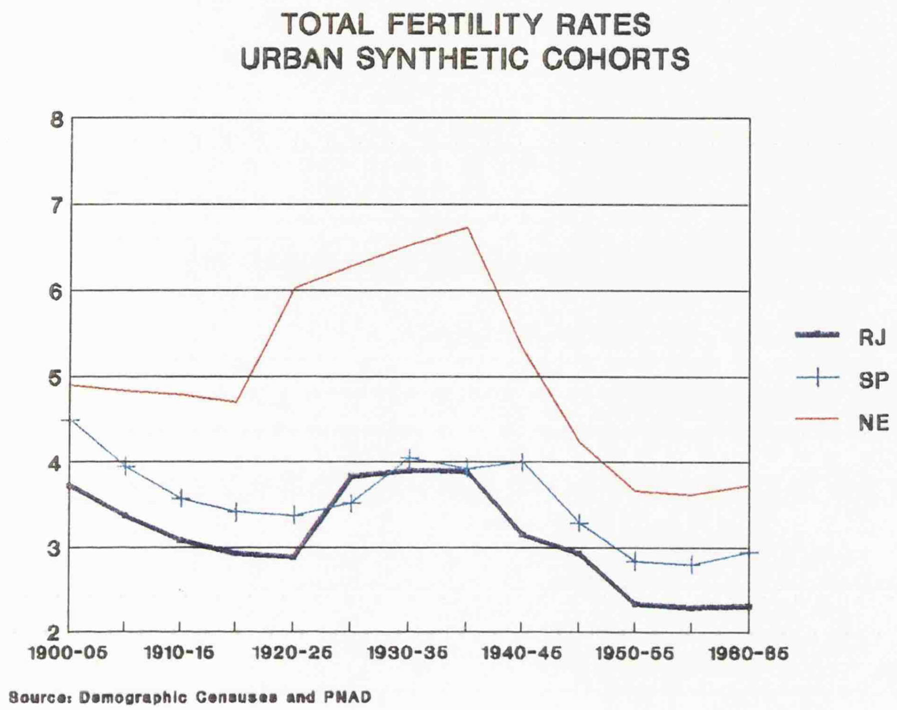
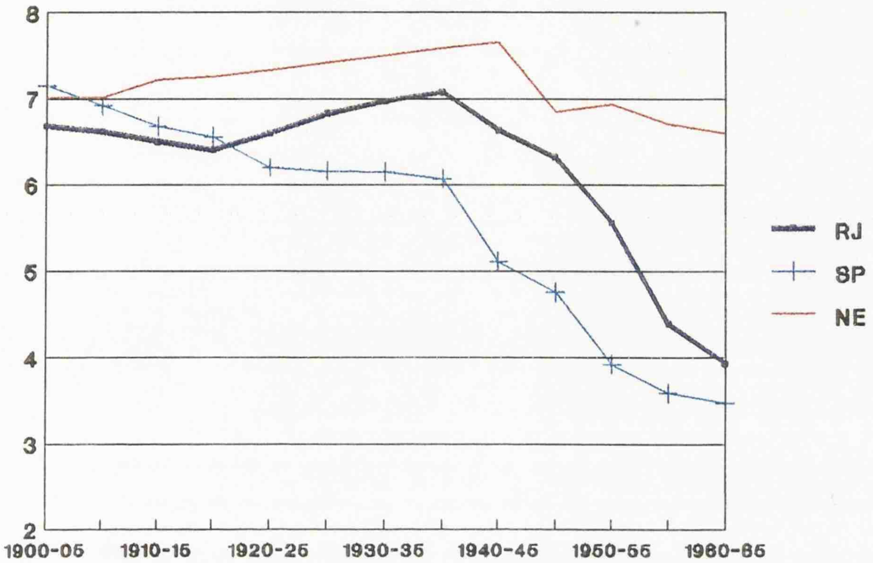


Figure 5.1

TOTAL FERTILITY RATES
RURAL SYNTHETIC COHORTS



Source: Demographic Censuses and PNAD

Figure 5.2

Marked rural-urban differences can be seen in Figures 5.1 and 5.2 at most times especially for the earliest cohorts. Broadly speaking, urban fertility showed a very similar pattern in Rio and in São Paulo: it declined, increased and declined again. However, the timing of these changes was regionally different. The first four cohorts experienced fertility decline while the following two cohorts exhibited fertility growth. The 1940-45 Rio birth cohorts resumed the earlier decline in fertility followed by the 1945-50 São Paulo cohort. Since then fertility decline was steady in Rio de Janeiro and a slight fertility increase is apparent in the 1960-65 São Paulo. The four first birth cohorts in the Northeast kept approximately stable their fertility. The fertility increase of the 1920-25 and 1925-30 birth cohort was experienced by all regions. Fertility decline started there among the 1940-45 birth cohort. The pace of fertility decline was much more intense there as fertility rates were much higher. The fall was continuos until the 1960-65 birth cohort whose fertility was slightly increased

Although rural fertility also declined dramatically, the pattern was less regionally homogeneous (see Figure 5.2). Rio de Janeiro had the lowest total fertility rate among all urban populations but not a particularly low rural rate (see Figures 5.1 and 5.2). The first four Rio birth cohorts experienced almost stable rural fertility and the next four cohorts exhibited increases. The rural fertility decline started by the same birth cohort that resumed the urban decline, the 1940-45 cohort. Fertility increased among the eight rural Northeast birth cohorts. After that it fell. The fall started among a birth cohort five years younger than that who began the urban fertility decline. São Paulo women living in rural areas exhibited the lowest total fertility among all rural women since the 1920-25 birth cohort. São Paulo fertility decline was continuous all the time but with differentiated pace among the cohorts. The most marked decline was experienced by the cohort born in 1940-45. This occurred among cohorts five years older than those which resumed the urban fertility decline.

A measure of regional and residence differentials is displayed in Figure 5.3, through the coefficient of variation. This is calculated as in Chapter 3, based on the ratio between the standard deviation and the Rio urban fertility rate. The standard deviation is calculated through the deviation of fertility rates of the two other areas in relation to that of Rio. It is assumed that if fertility is converging towards a low rate the rates should converge towards the Rio fertility rate. Three lines are shown in Figure 5.3. That called *urban* refers only to regional differentials in urban fertility. These peaked among the 1920-25 and 1940-45 birth cohorts and diminished since then.

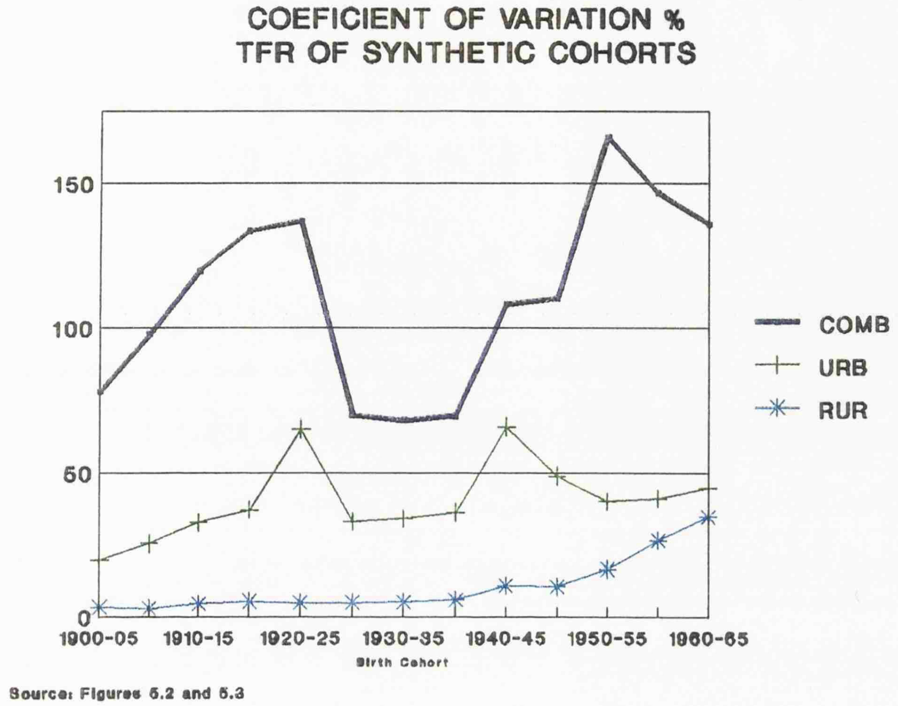


Figure 5.3

Coefficients of variation for rural populations are substantially lower than those for the urban especially until the 1940-45 birth cohort (see Figure 5.3, line *rural*). This means no marked regional differentials in rural fertility. The coefficients increased for the last four birth cohorts when rural fertility declined in Rio and São Paulo but was increasing in the Northeast. The first line of Figure 5.3, called *combined*, considers the deviation of all rates for both residence situations in relation to the urban Rio total fertility rate for each birth cohort. The high values are caused by the combination of regional and residence differentials. The residential are the more important. They grew when fertility declined and contracted when fertility increased. The Northeast fertility reduction contributed to a diminishing of the combined differentials among the two last birth cohorts.

Period total fertility rates are displayed in Table 5.2. They refer to the first quinquennium of the 1940s, 1960s, 1970s and 1980s.[268] The 1940 and 1960 censuses did

[268] The methodology used in their estimation was the same used in Chapter 3.

not publish any tabulation relating fertility to residence status. As the desegregation of the DHS data by residence results in very small sample numbers for Rio and São Paulo rural areas, the 1986 PNAD data are used instead. In order to obtain estimates for the more recent period (1980-85), total fertility rates were estimated using the Brass P/F ratio method.[269] The TFRs indicate that urban fertility was lower than rural rates at all times and in all regions. Apart from rural São Paulo, fertility increased in the 1940s and 1950s in all regions and residence situations. Rural fertility growth was less marked than the urban one.

Table 5.2
PERIOD TOTAL FERTILITY RATES AND COEFFICIENT OF VARIATION (CV) BY RESIDENCE AND TIME PERIOD
Brazilian Regions

Time-Period	Rio de Janeiro	TFR São Paulo	Northeast	CV%
URBAN				
1940-45	3.2	3.7	5.0	33.2
1960-65	4.1	4.2	6.9	33.0
1970-75	3.2	3.5	5.6	44.7
1980-85	1.9	2.4	5.9	78.1
RURAL				
1940-45	6.6	6.8	7.5	5.1
1960-65	7.3	6.3	7.8	5.7
1970-75	5.3	5.0	7.0	14.3
1980-85	4.0	3.7	6.9	36.6

Source: 1950, 1970 and 1980 Demographic Censuses and 1986 PNAD

Figures presented in Table 5.2 ratify the low fertility in urban areas of Rio de Janeiro already in 1940-45. This remained as the lowest fertility among the three areas over the whole period. However, Rio fertility increased during the 1940s and 1950s for both rural and urban residences. Fertility declined in the late 1960s but the decline was more dramatic in rural areas, especially in the 1960s. During the 1970s, urban fertility declined dramatically and in the first half of the 1980s it reached a value below the

[269] See United Nations (1983), pp 31-6.

replacement level, 1.9. The residence differential reduced over the period but it was still large in the first half of 1980s, 2.1 children.

The fertility pattern exhibited by urban São Paulo women was very similar to that of urban Rio women but with less marked changes. Considering the whole period, the TFR declined by 67% in Rio and by 52% in São Paulo. The difference in the decline is even larger if only the two last decades are considered, there being 118% and 75%, Rio and São Paulo, respectively. Fertility growth was also more noticeable in Rio de Janeiro. Rural fertility declined steadily over time in São Paulo, contrary to what was observed in the two other regions. It was already noted by Merrick that in São Paulo, rural areas experienced the earliest decline in rural fertility in Brazil which might be associated with land scarcity. He showed that in 1969, the number of births per thousand married women aged 20-24 declined as land utilization increased. This number ranged from 380 to 345 across five categories of land utilization. Merrick also suggested that these differences were due to fertility control.[270]

Northeastern urban women experienced a dramatic rise in fertility in the 1940s and 1950s, by almost two children per woman. Since 1960-65, fertility felt dramatically; the total fertility rate dropped from 6.9 in 1960-65 to 3.9 in 1980-85. Few changes were observed in Northeast rural areas. Some fertility decline was noticed in the 1960s, but the TFR was still 6.9 in 1980-85 and the rural-urban differential was three children at that time.

The last column of Table 5.2 displays the coefficients of variation in relation to Rio urban and rural TFRs, respectively. They point to an increase in the differentials in both residence situations, especially in 1980-85. This apparent divergence with the trends indicated by the urban cohort differentials is a result of the very large decline in the Rio total fertility rate in the last period which was not taken into account by cohort measures. The regional differentials in rural fertility are much less marked than those observed for the urban population but they also increased dramatically in the last period. Summarizing, there are no indications of a convergence in fertility levels among the regions, either in

[270] See Merrick (1978), p 325.

urban or in rural areas. Within regions this has happened only in São Paulo where fertility transition seemed to be more advanced in rural areas.

Figures 5.4 and 5.5 show the parity progression ratios for women aged 50-59 at the 1970 and 1980 censuses. They refer to urban and rural populations, respectively, and to the 1910-19, BC1, and 1920-29, BC2, birth cohorts. It is assumed that the parity progression ratios for these birth cohorts approximately measure fertility of the 1930s and 1940s, first and second cohorts, respectively. The convex shape of the Rio and São Paulo urban curves reinforces previous indications that a parity control fertility regime had already started in the 1930s (see Figure 5.4, BC1). The largest parity effect was noticed in the progression from the second to the third birth in both areas. In Rio, 84% of women who had one child went to the second. Among those who had a second child, 79% went to the third. The progression to the following parities showed a slight increase. A similar pattern was found among São Paulo women, although the parity progression ratios were higher, 89% and 82%, Rio and São Paulo, respectively. In the following decade, fewer women who had a second birth progressed to the third in both areas, 76% and 79%, respectively. This reinforces previous suggestions that the third birth might be a watershed for classifying families formation processes. An increase in the proportion of women who had the first and the second children between the two cohorts was observed in both areas.

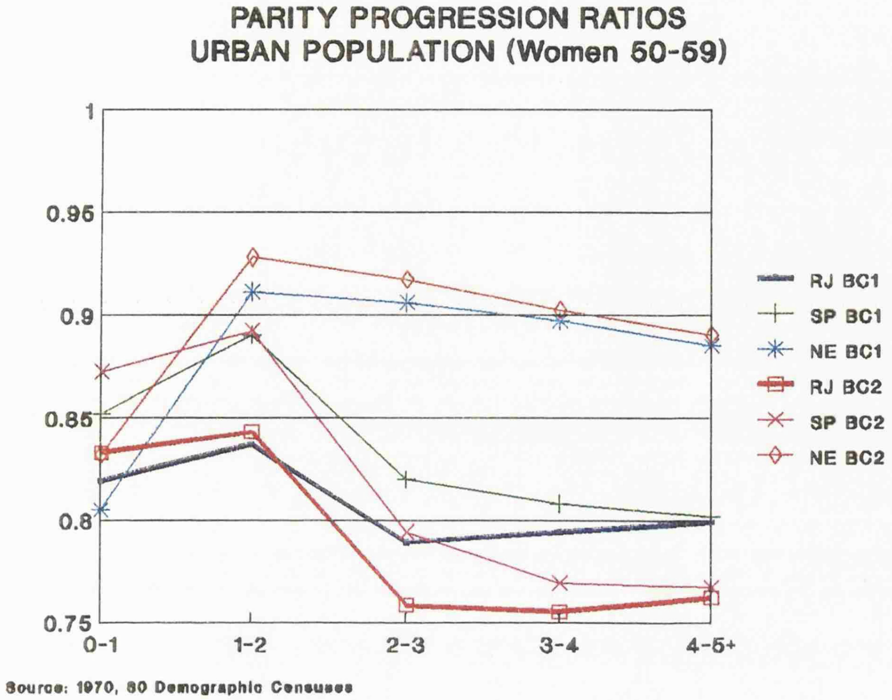


Figure 5.4

Among all the rural birth cohorts, only in São Paulo can slight indications of parity controlled fertility be seen (see Figure 5.5). Among that born in 1910-1919, parity progression ratios ranged from 0.953 to 0.846 there. The largest parity effect was observed in the progression to births of orders higher than four. Changes towards parity controlled fertility became clearer for the São Paulo 1920-29 birth cohort. Parity effect started at second birth order and accentuated at higher orders. No indications of a parity-controlled fertility regime could be identified in the Northeast urban areas or rural areas among the two birth cohorts (see Figures 5.4 and 5.5). The parity progression ratios were almost stable and the younger birth cohort showed a slight rise in both residence areas. The largest variation observed among the two birth cohorts was the increase in the progression to the first birth. This suggests that marriage or primary sterility were the main determinants of the Northeast fertility at that time which may be indicative of natural fertility.

5.2.3-Differences in Nuptiality by Residence

An attempt at understanding the fertility differentials by residence is done here, considering the role played by nuptiality. Census crosstabulations relating marital status to residence were only published in 1970 and 1980. The singulate mean age at marriage (SMAM) is displayed in Table 5.3. Single women with children were considered married, as discussed in previous chapters. The results point to earlier marriage in rural areas compared to urban areas in all regions. The rural-urban differences in SMAMs are more marked than the regional ones. They are largest in São Paulo in both time periods (1.9 and 1.8 years in 1970 and 1980, respectively). This indicator declined in the 1970s in both residence situations and in all regions. The largest decline was observed in the rural Northeast, 1.1 years. Fewer regional differences can be identified in SMAMs after controlling for residence. Among urban women, the lowest mean was found in the Northeast and the highest in Rio in both time periods. Among the rural, the lowest mean was found in São Paulo and the highest in Rio and the Northeast in both time periods. in total fertility rates.

Table 5.3
SINGULATE MEAN AGE AT MARRIAGE BY RESIDENCE
Brazilian Regions

Time-Period	Rio de Janeiro		São Paulo		Northeast	
	Urban	Rural	Urban	Rural	Urban	Rural
1970	23.7	22.3	23.5	21.6	23.3	22.3
1980	22.8	21.2	22.7	20.9	22.6	21.2

Source: 1970 and 1980 Demographic Censuses

The mean age at first birth is also considered in this analysis due to misreporting of marital status and the lack of this information in the 1950 census and the 1986 PNAD (see Table 5.4.) These data confirm the earlier onset of family formation process in rural areas, especially in São Paulo until 1980. In 1986, Northeastern women exhibited the lowest mean age at first birth. They and Rio women brought their first birth forward while São Paulo urban women kept this timing approximately stable apart from an increase during 1950-70. In urban areas, the earliest starting was found among Northeastern women over all time periods. Urban women did the opposite of rural ones; São Paulo women brought forward the first birth and others postponed it. São Paulo women exhibited the latest starting in 1950 and came to have the earliest in 1986: the mean age was about 0.6 years lower than Rio one. Changes in mean age at first birth were in the same direction as those in SMAM.

Table 5.4
MEAN AGE AT FIRST BIRTH BY RESIDENCE
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
Urban Areas			
1950	23.7	24.3	22.9
1970	24.1	24.2	23.3
1980	23.8	23.7	23.2
1986	24.1	23.4	23.5
Rural Areas			
1950	22.1	21.8	22.6
1970	22.6	22.2	22.8
1980	21.9	21.8	21.8
1986	21.6	21.7	21.4

Source: 1950, 1970 and 1980 Demographic Censuses and 1986 PNAD

5.2.4 Differences in Marital Fertility and Fertility Control

The Coale-Trussell indexes of fertility control, m and M, are estimated and they can be seen in Table 5.5 along with total marital fertility rates. The differences in the Rio and São Paulo urban marital fertility rates were not very clear in any of the two quinquennia although the directions of the differences changed during the period. São Paulo had the lowest fertility in 1960-65 and Rio had such in 1970-75. During the 1960s, the m values suggest the existence of fertility control in both areas as they exceed 0.25. A smaller value of M in urban São Paulo, which indicates more spacing or more fertility control by younger women, counterbalanced a larger m in Rio and resulted in a lower total marital fertility rate in São Paulo. By the early 1970s, m had increased more in Rio than in São Paulo and the decline in M was larger there as well. This resulted in a more marked decline in Rio total marital fertility rate.

Table 5.5
CURRENT MEASURES OF MARITAL FERTILITY AND FERTILITY CONTROL BY RESIDENCE
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
TMFR Urban			
1960-65	8.4	8.2	13.2
1970-75	5.8	5.9	9.9
TMFR Rural			
1960-65	11.1	9.4	12.4
1970-75	7.5	6.9	10.4
m Urban			
1960-65	0.692	0.675	0.240
1970-75	0.862	0.791	0.343
m Rural			
1960-65	0.239	0.392	0.169
1970-75	0.450	0.564	0.246
M Urban			
1960-65	0.978	0.942	1.330
1970-75	0.739	0.742	1.065
M Rural			
1960-65	1.121	0.997	1.229
1970-75	0.839	0.794	1.072

Source: 1970 and 1980 Demographic Censuses

.Urban Northeastern marital fertility was higher than the rural fertility in the early 1960s probably as result of 1 longer spacing in rural areas, more breastfeeding, as indicated by a larger *M* observed in urban area. Northeastern women also experienced a rise in *m* and a reduction in *M* in both residence areas. This was more accentuated among urban women and resulted in a more marked decline in marital fertility there. Nevertheless, even in urban areas in 1970-75, the *M* values in the Northeast suggest a marital fertility level higher than the Hutterites standard. Among rural women, the lowest marital fertility rate is found in São Paulo in both time periods. A marked increase in marital fertility control and in birth spacing was observed during the period in all three regions, especially in Rio de Janeiro.

Summarizing, Table 5.6 measures the contribution of nuptiality and of *other* proximate determinants to residential fertility differentials. Bongaarts' index of marriage, C_m, and C_{other} were estimated for the same time periods when marital status data are available.[1] During the 1960s, apart from Rio de Janeiro urban areas, nuptiality played the most important role in bringing fertility down. The contribution of the *other* factors declined dramatically during this period in all regions and was responsible for the fertility decline observed in both residence categories. This was more marked among women living in rural area of Rio de Janeiro. These factors became the most important determinants of Rio and São Paulo fertility trends in both residence categories. Apart from Northeastern rural women in 1960-65, C_{other} was more important among urban women.

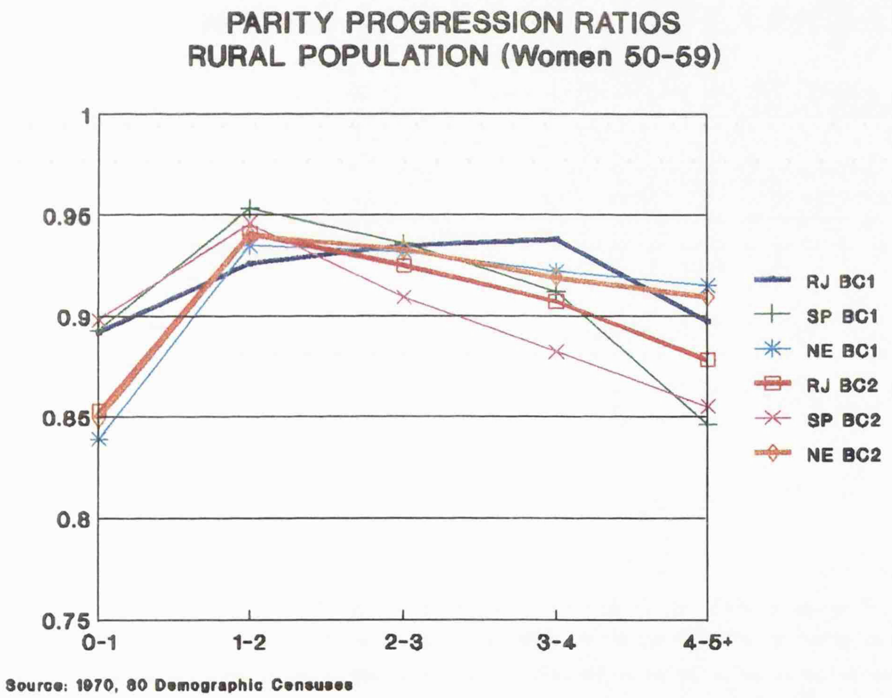


Figure 5.6

[1] The procedure used in the calculation of the contribution of nuptiality and of the *other factors* was the same as that used in Chapter 4.

Table 5.6
INHIBITING EFFECTS OF NUPTIALITY AND *OTHER* FACTORS ON FERTILITY RATES BY RESIDENCE
Brazilian Regions

Time-Period	Rio de Janeiro	São Paulo	Northeast
C_m Urban			
1960-65	0.494	0.517	0.524
1970-75	0.545	0.582	0.567
C_{other} Urban			
1960-65	0.548	0.535	0.863
1970-75	0.379	0.389	0.650
C_m Rural			
1960-65	0.656	0.670	0.626
1970-75	0.709	0.721	0.674
C_{others} Rural			
1960-65	0.725	0.613	0.812
1970-75	0.489	0.453	0.682
TFR Urban 1970-75 [1)]			
Standardized	2.9	3.1	5.2
Observed	3.2	3.5	5.6
TFR Rural 1970-75[(1)]			
Standardized	4.9	4.6	6.6
Observed	5.3	5.0	7.0
TFR Urban 5[(2)]			
1960-65	4.1	4.0	6.5
1970-75	3.2	3.2	5.4
TFR Rural 5[(2)]			
1960-65	5.5	4.6	6.1
1970-75	4.1	3.7	5.7

Source: 1970 and 1980 Demographic Censuses
Note: [(1)] Using 1960-65 C_m
[(2)] Using urban Rio's C_m

Among the three regions, nuptiality' strongest inhibiting impact was observed in urban Rio in both time periods. On the other hand, the lowest effect was found in rural São Paulo. Nuptiality was still more important than *other* factors in the Northeastern fertility. These findings are consistent with the estimates of the index of marital fertility control. Total fertility rates are calculated assuming no changes in nuptiality in the 1960s, in order to measure the impact of nuptiality on the total fertility rates. They are displayed in Table 5.6. The rise in nuptiality during the 1960s counterbalanced part of the impact of the inhibiting effect of the *other* factors and prevented further fertility decline. The fertility rates would have been 13% lower in urban São Paulo; 10% lower in urban Rio and about 8% lower in the urban Northeast and all rural areas.

Total fertility rates assuming urban Rio C_m for all regions are calculated and displayed in Table 5.6. They look for measuring the impact of regional nuptiality differences on fertility. As expected, the most important effect is that observed in rural areas. The simulation diminished part of the rural-urban fertility differential. For instance, in Rio de Janeiro in the 1960s this difference would have been more than halved, from 2.9 to 1.3 children, if no nuptiality differences had existed. In the following decade, the effect was also substantial, from 2.1 to 1.1. The simulation almost eliminated the differences in Rio and São Paulo urban fertility and slightly affected the differences in rural fertility. By the same token, the differences between Rio and Northeastern fertility, for both residence areas, would be reduced, especially between their rural areas in 1970-75.

Although nuptiality explains part of the residence differences on fertility, there is another component that might be explained by contraception. As seen before, the fertility decline observed in the period was caused by an increase in marital fertility control. Lazo (1994) estimated spacing and limiting indexes of fertility control for Brazil as whole and some regions, disaggregated by residence, using the methodology proposed by Rodriguez and Cleland (1988). They are based on the 1976 and 1984 PNADs. Her results for São Paulo and the Northeast are presented in Table 5.7 as well as the equivalent Total Marital Fertility Rate. They point to an increase in both indexes and a straight association between them and the marital fertility decline. In lower fertility areas such as São Paulo, the increase in spacing was more accentuated than those in stopping. The regional differences are also more marked in the spacing index.

Table 5.7
INDEXES OF SPACING (I_a) AND LIMITING (I_b) AND EQUIVALENT TOTAL MARITAL FERTILITY RATE BY RESIDENCE
Brazilian Regions

	I_a		I_b		TMFR	
Region	1976	1984	1976	1984	1976	1984
São Paulo	26.0	31.0	63.0	67.6	5.8	5.2
Northeast	9.7	16.6	45.7	59.1	8.6	7.0
Rural						
São Paulo	13.8	34.0	44.2	61.6	7.2	5.0
Northeast	-6.6	4.5	27.4	34.6	12.1	10.1

Source: Lazo (1994), p 13

5.2.5 Time-Period Changes in Residence Composition and Their Impact on Fertility Rates

As showed in Chapter 2, Brazilian urbanization has increased dramatically since 1940. As the rural-urban differentials in fertility were already important at that time, it would be expected that changes in residence composition could affect the fertility time period comparisons. Table 5.8 compares the observed 1960-65 total fertility rates with those standardized according to the 1950 residence composition in order to measure the effect of changes in residence composition on fertility. A similar procedure was also adopted, standardizing the 1970-75 and 1980-85 fertility rates according to the 1970 and 1980 compositions. Changes in residence composition did have an impact on total fertility rates in the 1960s in Rio and São Paulo. The range of total fertility rates would decline from 3.1 to 2.7 and the coefficients of variation from 33.4% to 25.5% if there had been no changes in the residence composition. Thus the fertility increase observed at that time would be even larger than the observed rise. During the 1970s, the composition effect was strongly reduced. This effect increased again and it was more marked in São Paulo. In Rio, this standardization resulted in unexpected results probably due to sample fluctuations. This would produce an enlargement of the regional differences. Summarizing, it is clear that the fertility decline and the regional differences were partially an outcome of changes in residence composition. However, it is also clear that the new reproductive behaviour was diffused from urban to rural areas.

Table 5.8
STANDARDIZED TOTAL FERTILITY RATE BY RESIDENCE COMPOSITION AND COEFFICIENT OF VARIATION (CV)
Brazilian Regions

Regions	Standardized	Observed	Difference %
1960-65(1)			
Rio de Janeiro	4.8	4.4	9.1
São Paulo	5.1	4.5	10.3
Northeast	7.5	7.4	0.9
CV (%)	25..5	33.4	23.7
1970-75(2)			
Rio de Janeiro	3.4	3.3	2.7
São Paulo	3.7	3.7	0.8
Northeast	6.4	6.3	1.9
CV (%)	49.5	51.2	3.3
1980-85(3)			
Rio de Janeiro	1.9	2.2	12.3
São Paulo	2.9	2.6	13.1
Northeast	5.2	5.4	4.2
CV (%)	126.9	98.8	-28.4

Source: 1970 and 1980 Demographic Censuses and 1986 PNAD
Note: (1) In relation to 1950 residence composition
(2) In relation to 1970 residence composition
(3) In relation to 1980 residence composition

5.2.6 Residence Composition Impact on Fertility Rates

As the Rio de Janeiro population was more urbanized than the other two regions and had the lowest fertility rate, an attempt at measuring the impact of regional differences in residence composition on regional fertility differences is also carried out. Total fertility rates, standardized according to Rio de Janeiro residence composition, are calculated for the two other regions and shown in Table 5.9. This was not calculated for 1980-85 due to the problem with residence composition data available for this period refer to population estimates and especially for Rio de Janeiro, they do not seem very consistent. The regional differences in fertility would be greatly reduced in all time periods if the residence composition was the same in the three areas. All the coefficient of variation would be reduced but their direction would be the same. It is clear that although differences in residence composition played an important role in the fertility differentials, they do not explain all of them. There is an important component of fertility that is explained by other regional conditions.

Table 5.9
STANDARDIZED TOTAL FERTILITY RATE ASSUMING RIO DE JANEIRO RESIDENCE COMPOSITION AND COEFFICIENT OF VARIATION
Brazilian Regions

Time-Period	STANDARDIZED	OBSERVED	DIFFERENCE %
1940-45			
Rio de Janeiro	3.8	3.8	
São Paulo	4.3	4.5	4.8
Northeast	5.5	6.8	24.1
CV (%)	23.3	41.1	76.5
1960-65			
Rio de Janeiro	4.4	4.4	
São Paulo	4.4	4.6	4.4
Northeast	7.0	7.4	6.3
CV (%)	28.6	33.4	17.0
1970-75			
Rio de Janeiro	3.3	3.3	
São Paulo	3.6	4.1	15.7
Northeast	5.7	6.8	18.0
CV (%)	41.9	51.2	22.2

Source: 1950, 1970 and 1980 Demographic Censuses

5.3- FERTILITY DIFFERENTIALS BY MIGRATION STATUS

The increase in interregional differences in fertility is unexpected as differences in some variables that are closely associated with fertility narrowed in the same time period. It is possible that the substantial interregional migration flows that occurred in Brazil may partially explain the divergence in regional fertility trends. Migration is selective of individuals at reproductive age and also of those with a higher propensity to assume new behavioural patterns than the non-migrant group. This selectivity can, in effect, transfer women who are more likely to lead a fertility decline to an area of in-migration in which fertility decline is already underway. Another possibility is that migration works an a channel of diffusion for new values put to small family size. In the short term, migration could be expected, to some degree, to reduce fertility by the disruption provoked by the transference. In the medium term, the effect may be reversed; the fertility decline may be slow down in in-migration areas as migrants in general have higher fertility than natives.

In this case, regional differentials would be narrowed. The reduction in fertility among migrants from high fertility areas after arrival is likely to have contributed to Brazilian overall fertility decline and to the widening of differentials in the medium term. This is particularly important in Brazil as migrants have been an important source of urban population growth since 1940.

5.3.1 What is Known?

There are few systematic studies of the impact which migration may have had on Brazilian fertility decline, on regional fertility differentials or of what mechanisms of interaction were actually involved. There are no published census crosstabulations which relate fertility to migration. All of the available studies are based on special censuses tabulations or survey data. An analysis of survey data for six Brazilian cities in the early 1960s by Iutaka et al confirms the effects of socio-economic status and length of residence on migrant reproductive patterns in Brazil. They found that socio-economic status played a more important role in migrants' fertility than was the case for natives. Thus, despite initial differences between fertility rates of recent migrants and other urban residents, the migrants succeeded in absorbing urban fertility patterns after a decade or more of urban residence.[272] Hutchinson analyzed urban fertility differentials by husband's place of birth, using survey data collected in eight Brazilian cities during 1959-60. He considered mean family size after ten or more years of marriage and found that the rural-born male experienced a higher family size, 4.9, than the urban-born, 3.3. If the husband's father was also urban-born, their fertility would be even smaller, 3.1.[273]

Further evidence of the relationship between migration and fertility was found in census data. Based on the 1970 Census, Carvalho and Vale showed that in four Brazilian metropolitan areas located in the lowest fertility regions, the South and Southeast, natives had the lowest fertility followed by the long-time migrants, 11 years of residence or more, and then, by recent migrants. They also found that fertility of the very new migrants, less

[272] See Iutaka et al (1971), p 58.

[273] See: Hutchinson (1970), pp 185-7.

than three years of residence, was systematically lower than the fertility of those who had lived in metropolitan areas for between three and five years. In contrast, no systematic differences in fertility behaviour were found between migrants and native born in metropolitan areas located in higher fertility areas, that is the North and Northeast.[274] This result is expected to some extent as migrants living in the Southeast and South regions exhibit more marked socio-economic differences compared to the native born in other regions. Moreover, fertility decline was more advanced in these regions compared to the other.

Wong compared fertility of native and migrant populations living in São Paulo in 1976 and 1980. Migrants experienced a TFR 50% higher, 4.1, than the native population, 2.7, in 1976. Both TFRs increased in the period and reached 4.3 and 3.0, for migrants and native, respectively. The increase experienced by the native population was larger, resulting in a slight relative reduction of these differentials. Her estimates are based on lifetime migrants and this might have underestimated the differentials.[275] Rio de Janeiro total fertility rates by residence and migration status, using the 1980 census data were estimated by Beltrão. He also found that migrants had higher fertility than natives with TFRs of 3.1 and 2.7, respectively. The estimates are also based on lifetime migrants which might have also underestimated the differentials.[276] The comparison of his results with those of Wong points to lower fertility in Rio de Janeiro independent of migration status. The regional difference was more marked among the migrant population.

5.3.2 Differences in Fertility

Total fertility rates controlled by migration status and based on the 1986 DHS are shown in Table 5.10. A migrant is considered to be someone who had lived in different municipality of that where they were born for less than ten years. The native population

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[274] See Carvalho and Vale (1976), p 14.

[275] See: Wong (1985), p 82.

[276] His results are disaggregated by residence situation. The estimates displayed here are a weighted average of the estimates by residence composition. See Beltrão (1990), p 5.

thus includes migrants who have lived there for more than ten years. Apart from the Northeast, where socio-economic differences between migrants and the native population should not differ very much, migrants exhibited markedly higher fertility than the native population. The largest difference was found in Rio de Janeiro with a difference of 1.3 children. There was no significative difference between Rio and São Paulo migrants fertility. Among all native populations, Rio women experienced the lowest fertility. This means that the fertility differences between Rio and São Paulo in the 1980s are explained by the fertility of the native born. The reverse was true for the 1970s as seen in section 5.3.1.

Table 5.10
TOTAL FERTILITY RATES BY MIGRATION STATUS
Brazilian Regions: 1980-85

Regions	TFR Migrants	TFR Native	N Migrants	N Native
Rio de Janeiro	3.6	2.3	160	589
São Paulo	3.5	2.8	274	495
Northeast	5.2	5.1	449	1.343

Source: 1986 DHS

5.3.3 Nuptiality Differences

Earlier and more intense nuptiality among the migrant population is considered one of the proximate determinants of their higher fertility. Castro and Simões found that migrants who lived in the Brazilian metropolitan areas in 1970 married earlier than the native population. This was not true only in Fortaleza, in the Northeast. The difference was more marked in the São Paulo and Rio de Janeiro metropolitan areas where migrants probably exhibit greater socio-economic differences compared to the native population. The indicators of intensity of nuptiality, percentage of single women aged 40-49 years, did not show such clear trends as did those related to precocity. Nuptiality was more intense among São Paulo migrants than among those in Rio de Janeiro. Among the three Northeastern metropolitan areas, this has not happened only in Salvador.[277] Monteiro (1979) measured the effect produced by migration on the estimation of the SMAM in

[277] See: Castro and Simões (1980), pp 39-40.

certain Brazilian states. He found out that it was in Guanabara, the Rio de Janeiro city, where the strongest effect was observed in 1970. Migration brought marriage forward by one year. For instance, excluding migration, the Guanabara SMAM would have been 26.4 years instead of 25.4. In São Paulo, the effect was not so strong. The SMAM would range from 24.2 to 24.6.[278]

Table 5.11 shows the mean age at marriage for marriages occurred in the ten years before the 1986 DHS survey according to migration status. DHS data also suggests that migration affected nuptiality timing in São Paulo and the Northeast. Migrants married earlier than the native population there. No difference in the onset of unions was found between migrants and native population in Rio de Janeiro. Migrants living there showed much later starting than those living in the Northeast and São Paulo. Migration in São Paulo and the Northeast contributed to a reduction of 0.4 and 0.2 years, respectively in the mean age at first union. This also contributed for an enlargement of 0.4 years in the range of variation of the mean ages. However, if considering only native born this range is still marked, 1.2 years.

Table 5.11
MEAN AGE AT FIRST UNION AND PROPORTION OF WOMEN IN UNION BY MIGRATION STATUS
Brazilian Regions

Regions	NATIVE	MIGRANTS	TOTAL
SMAM			
Rio de Janeiro	21.7	21.8	21.7
São Paulo	21.2	20.1	20.8
Northeast	20.5	19.9	20.1
% Women Aged 15-44 in Union			
Rio de Janeiro	56.1	73.1	59.2
São Paulo	57.6	60.0	58.4
Northeast	56.1	62.8	56.0

Source: 1986 DHS

Differences in the intensity of nuptiality by migratory status can also be seen in Table 5.12 through the percentage of the two populations who were married at the time of

[278] Quoted by Goldani Altman and Wong (1981), pp 366-8.

the survey. Both refer to women aged 15-44. The percentage of married migrants was substantially higher than the native population in all regions. Rio de Janeiro migrant women had the highest percentage of married women among all groups considered. Migration contributed to an increase of 5.5% in the percentage of women in union in Rio de Janeiro, 2.6% in the Northeast and 1.3% in São Paulo. Summarizing, it seems that migration affected nuptiality and was partially responsible for the regional differences. Sample numbers are not large enough to measure total marital fertility rates and thus the contribution of nuptiality to fertility.

5.3.4 Contraceptive Prevalence Differences

Table 5.12 presents the percentage of contraceptive users among the ever married women, according to the 1986 DHS. Apart from Rio de Janeiro, migrants contracept more than the native population. The differences are not very large. The percentage of users ranged from 50.5% among the Northeastern native population to 69.8% among the Rio de Janeiro native population. As the difference in total fertility rates were in the opposite direction to the differences in contraception prevalence except in Rio, the mix of method and the Bongaarts contraception index, $C_{c,}$ are also analyzed. Other methods were preferred to sterilization by all groups in all regions. Nevertheless, as the weight of each method was differentiated, this partially counterbalanced differences on prevalence. These lowest $C_{c,}$ almost identical, are found among Rio and São Paulo native born and São Paulo migrants. The residual difference in fertility might be explained by nuptiality that was more intense among migrant population and also by a time lag between the start of contraception and the fertility outcome. As migrants tend to adopt the native fertility after some time, it is probably that they started to do so more recently and at a later stage of their reproductive life.

Table 5.13
PREVALENCE BY METHOD AND MIGRATORY STATUS
Brazilian Regions 1986

Method	Rio de Janeiro	São Paulo	Northeast
Migrant			
All	67.7	71.9	53.2
Sterilization	25.3	24.2	23.0
Other Method	42.4	47.7	30.1
C_c	0.356	0.320	0.489
Native Born			
All	69.7	69.7	50.4
Sterilization	32.7	32.3	24.8
Other Method	37.0	37.4	25.6
C_c	0.326	0.327	0.510

Source: 1986 DHS

Summarizing, migrants had higher fertility than the native population in lower fertility areas. A more intense nuptiality among Rio migrants and less contraception use seems to explain their higher fertility. Earlier and also more intense nuptiality among São Paulo and Northeastern are apparently the responsible factors for their higher fertility. It seemed that migration did not play any role in the regional differentials either those between Rio and São Paulo or those between the Northeast and the two other areas. It has also been suggested in several sections of this thesis that migration might have indirectly acted as an inhibiting factor of Northeast fertility. It is likely that the lower nuptiality observed there was a result of more male emigration.

5.4-FERTILITY TRENDS FOR ETHNIC GROUPS

To analyze time-period trends by ethnic group additional difficulties arise: the lack of any question about ethnicity in the 1970 census and the 1986 DHS; the fact that the 1960 census did not publish any crosstabulation relating this variable to fertility; the 1980 census published only one tabulation relating all women aged 15 and over to the number of children ever born by parity. The 1986 PNAD gathered this information but the published data aggregated black with mixed race women. Crosstabulation relating marital status and ethnicity was available only in the 1950 census. As a result, this section is very much based on the 1940 and 1950 censuses and on previous published works.

5.4.1 What is Known?

Smith (1954) worked with a special tabulation of the 1889 census for the city of Rio de Janeiro and found that the black population reproduced at a much slower pace than either whites or mixed races. He calculated the mean number of children per couple as 3.5 for the white population; 3.0 for blacks; 4.0 for mixed blacks and indians and 3.3 for mixed white and blacks.[279] This finding of lower fertility among the black women was also supported by Mortara, for most Brazilian states. Among the three studies regions, the black population had the lowest fertility in São Paulo and the Northeast. However, they showed the highest fertility in Rio de Janeiro. His conclusions were based on the mean number of children ever born for women aged 15 and over using data from the 1940 census.[280] Saunders, based on the 1950 census, found lower fertility for black women in the three areas studied here. His conclusion is also valid if residence is controlled. The mixed groups had the highest reproduction rates.[281] His conclusion is likely to be affected by the measure utilized which was the ratio of children under 5 to women 15-49. This is strongly affected by childhood mortality which was probably higher among the black population.

Another study undertaken by Hutchinson, based on a survey carried out in 1963 in Rio de Janeiro city found that the highest average number of live births per woman aged 20-50 occurred for the mixed races, 2.6, closely followed by black women, 2.5. Age-specific fertility indicates that up to the age of 44 the number of black live-births consistently exceeds that for whites. This differential is not affected if married women are considered. The mean number of live births per married women was 2.6 for whites; 3.3 for the mixed races and 3.2 for black women.[282]

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[279] Quoted by Saunders (1958), p 54.

[280] These measures are age standardized in order to eliminate differences due to the age distribution in the various states. See Mortara (1954), p 434.

[281] See: Saunders (1958), p 55.

[282] See Hutchinson (1965), pp 12-5.

5.4.2 Fertility Trends

An attempt at measuring fertility differentials by ethnic groups in the early decades of this century is carried out in Figures 5.6 and 5.7. Cohort fertility rates of cohorts born between 1890 to 1925 according to ethnic groups are calculated based on the 1940 and 1950 censuses data. These again use the Brass technique of the synthetic cohorts. A comparison of the 1940 data by ethnic groups with the following census might be affected by the way information was gathered. In all censuses, information was obtained on the skin colour of the informant. However, in 1940, the census enumerator was given the task of classifying the persons interviewed as to racial affiliation or skin colour. Since the 1950 census this declaration was left to the discretion of the person being enumerated.

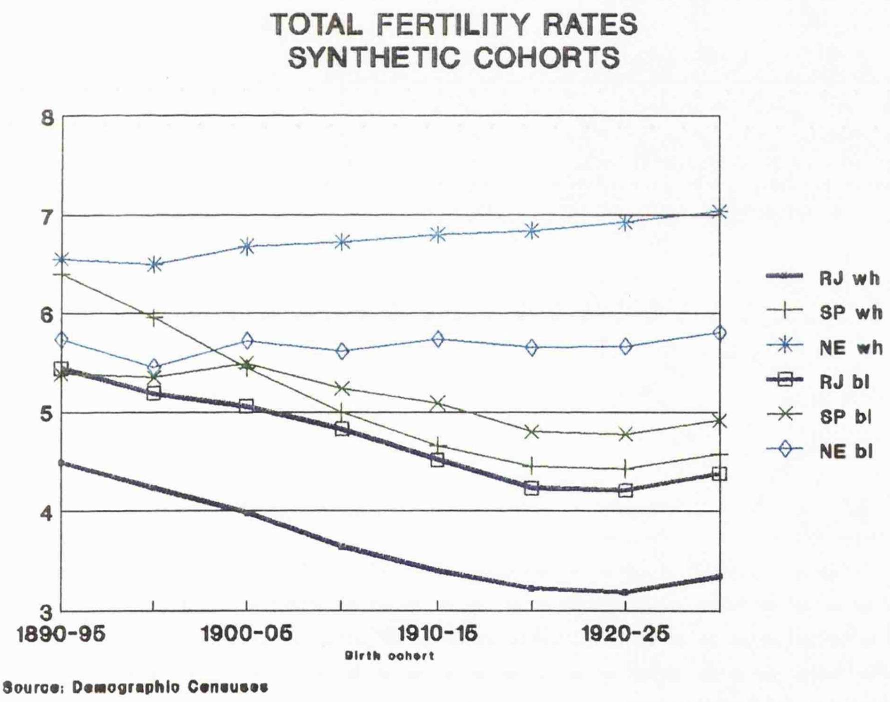

Figure 5.6

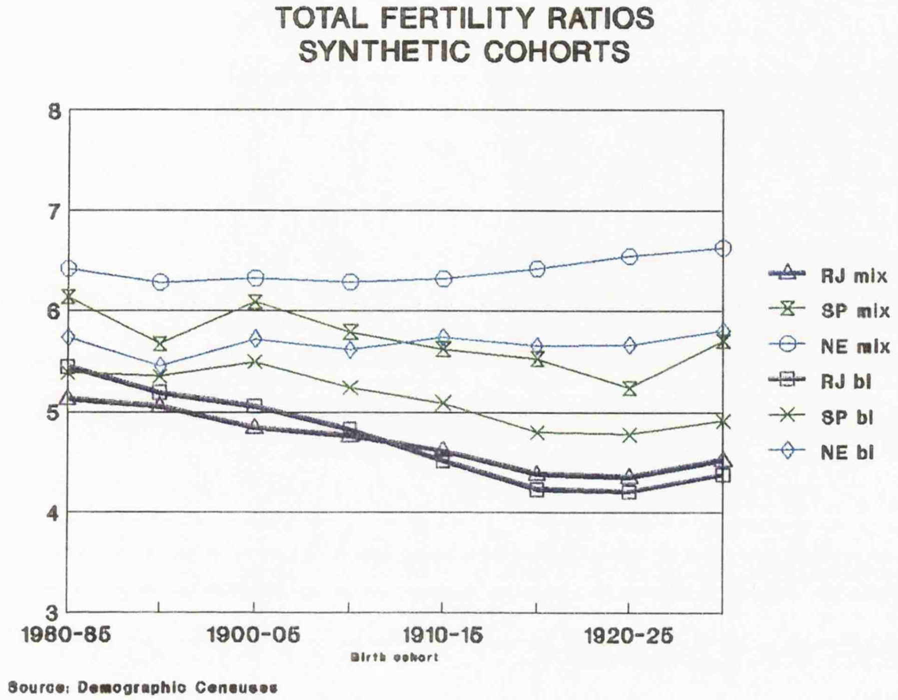

Figure 5.7

Figure 5.6 compares white (wh) and black (bl) fertility while Figure 5.7 compares mixed (mix) and black fertility in all regions. The lowest regional fertility was found among white Rio women. Also the other Rio ethnic groups exhibited lower fertility than any group of the two other regions. Fertility of white Rio women declined steadily over the period until the last cohort who experienced a slight increase. The first four black birth cohorts exhibited the highest fertility and mixed women born after 1910-15 came to have the highest fertility rates in Rio de Janeiro (see Figure 5.7). Black fertility declined slightly over the period and fertility of the mixed women was almost stable. The fertility differences between the white and the two other groups were quite marked and peaked for the birth cohort 1910-15.

Among the first two birth cohorts in São Paulo, white women had the highest fertility (see Figure 5.6). The following cohorts until the 1910-15 experienced a dramatic fertility decline. Fertility was approximately stable among the next three cohorts. The highest fertility rates were found among women of mixed race from the cohorts born in 1900-05 on (see Figure 5.7). These rates were stable after the increase experienced by the 1900-05 cohort and declined slightly until the last one who also had their fertility increased. Black fertility in São Paulo fell between the fertility of mixed and white women from the third birth cohort on. Apart from an increase experienced by the 1900-05 birth cohort, their fertility was approximately stable most of the time. It is apparent that fertility decline started also among white São Paulo women by the same time as in Rio de Janeiro but departed from higher fertility. The pace of fertility decline was faster in São Paulo than in Rio. Thus, the difference in the TFR of white Rio and São Paulo women declined from 2.0 children for the first birth cohort to 1.3 for the last one.

Black women exhibited the lowest fertility in the Northeast among all birth cohorts (see Figure 5.7). The highest fertility was experienced by white women which was higher than any other group in any region (see Figure 5.6). Northeast fertility increased among all ethnic groups. This was more marked among white women.

A measure of the combination of regional and ethnic fertility differentials is displayed in Figure 5.8, the coefficient of variation. The first line, *combined*, considers the deviation of all rates, independently of the ethnic group or region, to the Rio white women total fertility rate for each birth cohort. This points to a widening of the fertility differentials until the birth cohort 1915-20. The differences were enlarged by the Northeastern fertility increase. The fertility rise observed among Rio and São Paulo last birth cohorts contributed to a stabilization of this coefficient. The coefficients of variations are also calculated separately for each ethnic group in order to only measure the regional effect. Their values are substantially reduced but all point to an increase in the differentials. The most marked were those among the white women as in Rio and São Paulo the fertility decline was already advanced. No marked differences are observed among the other groups which may mean few changes in terms of fertility decline in all regions.

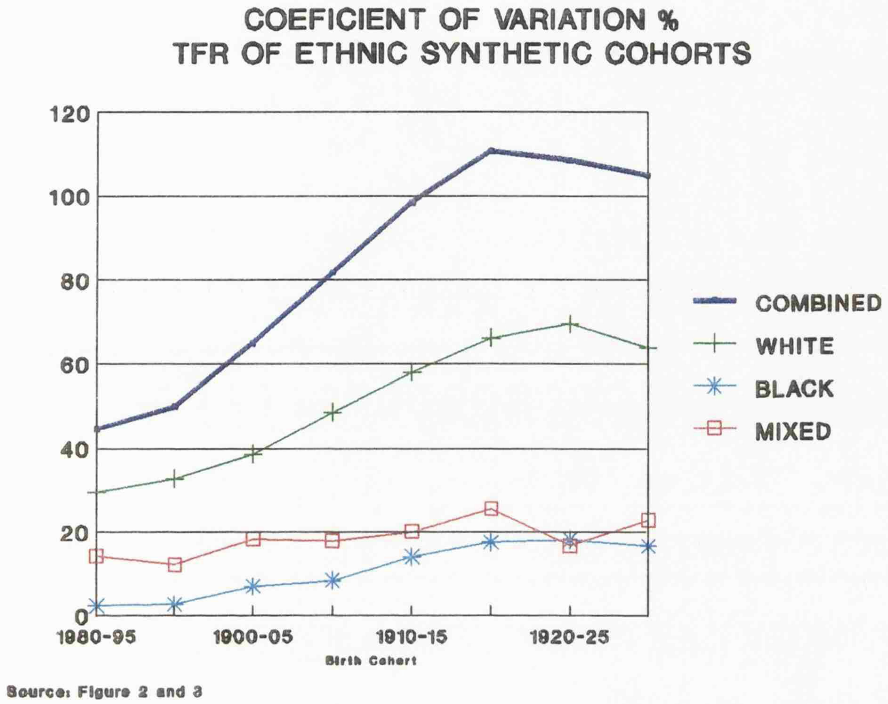

Figure 5.8

Period total fertility rates estimated for the quinquennia 1930-35, 1940-45 and 1975-80 according to women's ethnic composition are displayed in Table 5.13. The last estimates are based on the 1986 PNAD whose published data aggregated mixed with black women and labelled them coloured. For temporal comparisons, a total fertility rate for this group was also calculated for 1940-45, combining the two groups of women. Estimates for 1980-85 are not presented here, as the P/F ratio method did not produce consistent results. Those showed are based on Frias and Oliveira method used on Chapter 3. The results are consistent with the previous findings. The lowest fertility was found in Rio de Janeiro in all ethnic groups in the two first time periods. There, the lowest fertility was found among white women and the highest was found among mixed race women. Fertility declined among all ethnic groups and the direction of the differentials was not altered.

Table 5.13
PERIOD TOTAL FERTILITY RATES BY ETHNIC GROUP AND TIME PERIOD
Brazilian Regions

Regions	WHITE	MIXED	BLACK	COLOURED[1]
1930-35				
Rio de Janeiro	4.0	5.0	4.8	
São Paulo	5.7	5.9	5.6	
Northeast	6.6	6.5	5.6	
1940-45				
Rio de Janeiro	3.5	4.7	4.5	4.6
São Paulo	4.7	5.8	5.1	5.2
Northeast	7.1	6.7	5.2	6.6
1975-80				
Rio de Janeiro	2.5			3.4
São Paulo	3.2			3.5
Northeast	4.2			5.2

Source: 1940 and 1950 Demographic Censuses and 1986 PNAD
Note: [1] Mixed and black women grouped together

Black São Paulo women had the lowest fertility in 1930-35 but white women's fertility declined dramatically and this position was reversed in 1940-45. White women come to show the lowest fertility and the mixed race the highest. Fertility fell among other groups as well. In 1975-80, the difference between the two ethnic groups were not very clear. Those between coloured women living in Rio and São Paulo in 1975-80 are not expressive. This may suggest that the fertility differences between these two areas are a result of white women's fertility. This difference was 0.8 children. Black Northeastern women had the lowest fertility in their region in 1930-35 and 1940-45 and white women had the highest. Black women experienced a fertility decline and the two other ethnical groups experienced a fertility growth through the 1930s. Fertility declined after that and this was more marked among white women. The fertility differences were enlarged and white women came to show the lowest fertility in 1975-80. Nevertheless, their fertility was still higher than that of coloured women in Rio or São Paulo.

Three measures of the coefficient of variation are shown in Table 5.14; the first one, *ethnic group*, compares the ethnic fertility differences within each area during the three time periods. All regions experienced a increase in the differentials over this time, except São Paulo in the last quinquennium. They are quite marked in Rio, especially in

1975-80. The second measure, *regions*, is a summary of the regional differences by ethnic group. The largest differences are found among white women in all time periods. Large coefficient of variations seems to be associated with fertility decline. The combination of the two measures of differentials, *combined*, points to a widening in fertility differentials followed by a narrowing. The narrowing must be carefully analyzed as the information for this period aggregates mixed and black women.

Table 5.14
COEFFICIENTS OF VARIATION BY TYPE AND TIME PERIOD(%)
Brazilian Regions

Type	1930-35	1940-45	1975-80
Ethnic group			
Rio de Janeiro	19.7	42.9	63.0
São Paulo	2.1	10.9	4.6
Northeast	5.9	6.7	11.9
Regions			
White	38.9	59.2	44.1
Mixed	15.3	23.6	NA
Black	9.7	14.8	NA
Coloured	NA	NA	25.9
Combined	51.4	112.9	73.5

Source: Table 5.13
Note: NA =not applicable

Table 5.15 displays Bercovich 's results for Rio de Janeiro and São Paulo, based on special tabulations of the 1960 and 1980 censuses and the 1984 PNAD. They indicate lower fertility among white women in 1960 and higher among mixed race women. A more marked fertility decline was observed for white women during the 1960s and for mixed race women over the 1980s in both areas. As a result, black women exhibited the highest fertility in 1984. In São Paulo, the difference between the fertility of mixed race and black women disappeared in the last time period and in Rio this was widened. Fertility decline was more accentuated in Rio de Janeiro among all ethnic groups and during all time periods. The largest regional difference was found among mixed race women. In 1984, the lowest TFR was found among white Rio, followed by the white in São Paulo and Rio mixed race women , whose TFR was identical to the São Paulo white women. In third position, were black Rio women which TFR was lower than those for mixed race and black women in São Paulo.

Table 5.15
TOTAL FERTILITY RATES BY ETHNIC GROUP AND TIME PERIOD
Brazilian Regions

Groups	1960	1980	1984
Rio de Janeiro			
White	4.5	2.7	2.3
Mixed	5.3	3.4	2.7
Black	5.1	3.5	3.3
São Paulo			
White	4.7	3.1	2.7
Mixed	6.1	4.0	3.5
Black	4.9	3.9	3.5

Source: Bercovich (1990), p 5 and Bercovich (n.d.), p 5

5.4.3-Fecundity Differences by Ethnic Group

Disadvantages for black women as regard marriage have been considered one important explanation for their lower fertility.[283] According to Hutchinson, this is a result of the fact that marriage with persons of lighter skin than oneself is preferred and that marriage with persons of darker skin is avoided. This means that while black males might seek to marry mixed race women, black women are not "compensated" by mixed race men seeking to marry them. To the degree that black males are successful, an equal number of black women remained unmarried.[284] Other factors must be considered as well such as ethnic differences in primary sterility, fecundability and induced abortions.

As the 1940 census did not publish any tabulation relating marital status to ethnic group, Mortara calculated the proportion of prolific women, women who had at least one child, age standardized, for the Brazilian states. Table 5.16 shows these percentages for women aged 15 and over in the three areas. The regional percentages are the weighted

[283] See. for instance: Mortara (1954), Smith (1958), Hutchinson (1965), Berquó (1988), Lazo (1988), Bercovich (1990).

[284] See Hutchinson (1965), p 9.

averages of the states percentages according to the ethnic composition of each state. The comparison suggests that there were no marked differences in the chance of a woman being a mother by ethnic group, except in São Paulo. This is due to the large difference between white and black women there, 7.8%, being the whites the most prolific. Black women were the least prolific in São Paulo and the Northeast. The highest percentage of mothers was found among mixed race women there and in São Paulo. White women in Rio exhibited the lowest percentage of prolific among all women, followed by blacks in the Northeast.

Table 5.16
PERCENTAGE OF WOMEN AGED 15 AND OVER WHO HAD CHILDREN EVER BORN BY ETHNIC GROUP
Brazilian Regions 1940

Regions	White	Mixed	Black
Rio de Janeiro(1)	56.4	58.1	57.3
São Paulo	63.2	62.3	58.6
Northeast(1)	59.1	59.9	57.1

Source: Mortara (1954), p 432
Note: (1) Weighted average according to population ethnic composition

As previously mentioned, the information gathered by the 1950 census refers to the number of children as a whole, including stillbirths, which makes time trend comparisons troublesome. They reflect women's exposure to pregnancy and their fecundity but not their pure fertility. Table 5.17 shows the percentage of childless women among all women aged 30-39, 40-49 and 50-59 by ethnic group. These percentages confirm the trend pointed out by the previous census: black women were the least prolific in São Paulo and the Northeast. Apart from the age group 30-39, white women were the least prolific in Rio de Janeiro. There and in the Northeast, the most prolific were those of mixed race and in São Paulo they were the whites.. Among the three regions, São Paulo women showed the lowest percentage of childless women for all ethnic group.

Table 5.17
PERCENTAGE OF CHILDLESS WOMEN BY ETHNIC GROUP AND AGE GROUP
Brazilian Regions 1950

Age Groups	WHITE	MIXED	BLACK
30-39			
Rio de Janeiro	25.8	22.8	26.4
São Paulo	17.5	18.3	23.2
Northeast	21.0	19.0	23.6
40-49			
Rio de Janeiro	22.4	19.3	22.0
São Paulo	14.0	15.4	19.6
Northeast	18.5	16.6	21.0
50-59			
Rio de Janeiro	22.0	19.5	21.8
São Paulo	13.0	16.2	18.9
Northeast	19.3	17.8	22.3

Source: 1950 Demographic Census

Table 5.18 shows a proxy of the total fecundity rate which was again, calculated as the total fertility rate using women who had children as the denominator. This measures the joint effect on fertility rates of prevalence of unions and primary sterility. Those considered as ever being in unions are women who had at least one child. It also displays the difference between the total fecundity rate and the TFRs. The largest difference between the two rates is observed among black women in all regions and both time periods, especially in Rio de Janeiro. The smallest difference is noticed among mixed race women in Rio and the Northeast and among whites in São Paulo.

Table 5.18
TOTAL FECUNDITY RATE BY ETHNIC GROUP AND TIME PERIOD
Brazilian Regions

Regions	WHITE	MIXED	BLACK
1930-35			
Rio de Janeiro	4.6	5.6	5.9
São Paulo	5.8	6.3	6.2
Northeast	7.1	6.9	6.3
Difference (%)			
Rio de Janeiro	15.5	10.9	23.7
São Paulo	2.2	6.2	12.1
Northeast	7.4	5.8	12.1
1940-45			
Rio de Janeiro	4.1	5.2	5.4
São Paulo	4.4	6.1	5.7
Northeast	7.6	7.1	6.6
Difference (%)			
Rio Janeiro	18.1	12.4	19.2
São Paulo	4.7	9.0	12.8
Northeast	6.3	5.3	11.1

Source: 1940 and 1950 Demographic Census

In Rio de Janeiro, the highest fecundity was observed among black women in both time periods while mixed race women had the highest fertility. This suggests that blacks were either discriminated against in the matrimonial market or were more sterile. Fecundity fell among all ethnic groups confirming the fertility decline indicated by the fertility rates (see Table 5.13). Black women fecundity decline was higher than higher than the fertility decline. This may suggest some reduction in primary sterility or an increase in nuptiality which prevented further fertility reduction.

Black women in São Paulo had a slightly lower fertility than the whites in 1930-35 and their fecundity was higher (see Tables 5.13 and 5.18). The decline in fecundity was higher than that in fertility as in Rio. This was also higher than that exhibited by mixed race women. Blacks exhibited lower fecundity than the mixed race women in both time period. White women experienced the largest decline in fecundity in São Paulo. Black women had the lowest fecundity in the Northeast and whites had the highest in both time periods (see Table 5.18). This differentials are in the same direction as those pointed by fertility rates (Table 5.13). Although this seems to reflect a genuine lower fertility among black women, this does not look as indicating an onset of fertility transition as stated by the Coale conditions, for instance. This probably reflects higher male adult mortality, more broken unions, higher intrauterine mortality or longer breastfeeding among blacks. Fecundity increased in the Northeast among all ethnic group confirming the fertility increase indicated by the fertility rates. An important difference is that fertility declined among the blacks while fecundity increased. This suggests reduction in nuptiality or increase in primary sterility.

New measures of the coefficient of variation based on fecundity rates are shown in Table 5.19. The first, *ethnic differences*, compares the ethnic fecundity differences within each area. These are also quite marked in Rio but smaller than those based on fertility measures. They also increased in 1940-45 (see Table 5.15). A similar pattern was found among Northeastern women and an opposite in São Paulo. Differences in fecundity are larger there than fertility differences. They also increased dramatically during the period. This suggests that the differences in the percentage of childless women mask part of the ethnic fertility differences. In the two other areas, part of the ethnic fertility differences seems to be caused by differences in fecundity.

Table 5.19
COEFFICIENT OF VARIATION BY TYPE AND TIME PERIOD (%)
Brazilian Regions

Type	1930-35	1940-45
Ethnic Differences		
Rio de Janeiro	16.6	20.5
São Paulo	4.8	12.8
Northeast	4.4	5.2
Regional		
White	27.8	42.6
Mixed	11.3	17.2
Black	7.0	16.7
Combined	49.1	73.2

Source: Table 5.18

The second measure, *regional*, displayed in Table 5.19 is a summary of regional differences by ethnic group. The pattern of differentials is the same as those shown by the fertility rates (see Table 5.14), but less marked. They increased over the period and the highest variation is observed among white women. The combination of the two measures of differentials, *combined*, suggests an increase in the differentials of fecundity over the 1930s as it was estimated for fertility rates but generally less diverse.

Summarizing, regional and ethnic differences in the percentage of childless women did play some role in the fertility differentials, especially in Rio and São Paulo. The most important was the change in the relative position of black women that seems very much affected by nuptiality and primary sterility. The fertility temporal trends were not affected by variations in the percentage of women who had children except among black Northeastern women. Childlessness provoked a fertility decline there that it was not confirmed by fecundity. Among Rio black women it prevented further fertility decline.

5.4.4 The Onset of Reproduction

The onset of the family formation is affected by the mentioned discrimination in the matrimonial market against black women. Table 5.20 shows the mean age at first birth for the three groups of women and regions in the 1940 and 1950 censuses. Apart from the Northeast in 1940, mixed women started motherhood earlier in all areas and time period. Black women had the latest onset. The ethnic differences at starting were clearer among São Paulo and Northeastern women in 1940, about 0.8 years. Few changes in the timing of first birth occurred in the period; it was postponed by black Northeastern women and brought forward by those of mixed race living in São Paulo and the Northeast. The differences by ethnic groups were narrowed in the Northeast.

Table 5.20
MEAN AGE AT FIRST BIRTH BY ETHNIC GROUP AND TIME PERIOD
Brazilian Regions

Time Periods	WHITE	MIXED	BLACK
1940			
Rio de Janeiro	23.4	23.1	23.4
São Paulo	23.1	22.7	23.6
Northeast	22.7	23.0	22.2
1950			
Rio de Janeiro	23.3	23.0	23.4
São Paulo	23.2	22.5	23.2
Northeast	22.7	22.5	22.9

Source: 1940 and 1950 Demographic Censuses

Table 5.21 displays some legal nuptiality indicators, the percentage of women aged 50-59 who remained single and the singulate mean age at marriage by ethnic groups based on the 1950 census. Mixed race women also started earlier if legal marriage is considered as an indicator of the onset of family formation. Only in the Northeast did white women marry slightly earlier than mixed race women. Difference between black and mixed women was about one year in the Northeast and São Paulo. Those between black and white women were 1.2 and 0.6 years in the Northeast and São Paulo, respectively. The largest ethnical difference in the age at marriage was found in Rio de Janeiro. Black women married on average 2.1 years later than the mixed women and 1.7 years later than the white.

Table 5.21
NUPTIALITY INDICATORS BY ETHNIC GROUP
Brazilian Regions 1950

Regions	SMAM	% SINGLE$^{(1)}$	DIFFERENCE$^{(2)}$
White			
Rio de Janeiro	23.3	11.5	0.8
São Paulo	22.4	5.9	9.2
Northeast	22.5	13.8	2.8
Mixed Race			
Rio de Janeiro	22.9	18.2	1.3
São Paulo	22.0	8.5	5.0
Northeast	22.7	18.3	-1.9
Black			
Rio de Janeiro	25.0	25.0	-19.9
São Paulo	23.0	11.5	2.4
Northeast	23.7	29.7	-9.2

Source: 1950 Demographic Census
Note: $^{(1)}$ Women at age 50-59
$^{(2)}$ Difference in months between the SMAM and the mean age at first birth

The percentage of single women points to a clear disadvantage for black women, followed by the mixed race, as regards legal marriage in all regions,[285] especially in the Northeast. It is possible that black women were more likely to be engaged in informal unions than whites. Since the 1950 census did not consider women in consensual unions as married, this percentage might be overenumerated. If the percentage of childless women at the same age is considered as an indicator of intensity of unions, it is suggested that black women were in disadvantageous compared to the two others groups even in informal unions, except in Rio de Janeiro, and probably were more affected by primary sterility (see Table 5.17). There are no indication of discrimination against mixed race women. They even had the lowest percentage of childless women except in São Paulo. The difference between the SMAM and the mean age at first birth suggests that apart from white São Paulo women, marriage seemed to have partially legitimated motherhood. This

[285] Hutchinson (1965, p 11) survey data for the city of Rio de Janeiro in 1963, point to a higher percentage of married women among the white women, 80.4%, than the blacks, 75.2%. No marked differences were found among whites and mixed races, 79.1%.

was much clearer among Rio black women and among Northeast blacks and mixed race for whom motherhood seemed to have started before legal marriage.

The only tabulation published by the 1980 census relating fertility to ethnic group allows the calculation of the percentage of women who had ever borne children among all women aged 15 and over and their mean parity. These indicators are shown in Table 5.22. Although they are affected by age-distribution differences, they seem consistent with previous findings. No marked differences were found in the percentage of mothers among the ethnic group of Rio de Janeiro as previously observed. White women were both less fertile, measured by the mean number of children ever born by all women and less fecund, accepting the mean number of children ever born by women who had at least one child as a proxy for fecundity. Fewer differences can be observed between the two other groups. Fertility and fecundity were lower in Rio de Janeiro for all groups than in the two other areas.

Table 5.22
PERCENTAGE OF WOMEN AGED 15 AND OVER WHO HAD CHILDREN EVER BORN AND MEAN PARITY BY ETHNIC GROUP
Brazilian Regions 1980

Regions	WHITE	MIXED	BLACK
% MOTHERS			
Rio de Janeir o	62.9	62.5	62.9
São Paulo	65.5	63.7	61.5
Northeast	61.0	62.1	61.9
FERTILITY(1)			
Rio de Janeiro	2.1	2.6	2.4
São Paulo	2.3	2.6	2.7
Northeast	4.3	3.4	3.5
FECUNDITY(2)			
Rio de Janeiro	3.3	4.1	3.8
São Paulo	3.4	4.3	4.2
Northeast	7.1	5.5	5.6

Source: 1980 Demographic Census
Note: (1) Children ever born by all women
(2) Children ever born by women who had at least one child

In the Northeast, white women were less likely to become mothers than the other groups but they had the highest fertility and fecundity rates (see Table 5.22). There is no suggestion of discrimination against black or mixed women being in a union but these might be less fertile unions which could be caused by widowhood and separations, higher intra-uterine mortality or longer breastfeeding. In São Paulo, black women do seem to be discriminated against in the matrimonial market compared to whites and mixed race women. This discrimination might be associated with the lower frequency of consensual unions there. They exhibited the lowest percentage of mothers but they had higher fertility and fecundity compared to white women. Lazo confirms the disadvantageous marital situation of black São Paulo women based on the 1984 PNAD and concluded that this situation was not a consequence of a lower sex ratio. In fact, black and mixed women had a sex ratio of 1.02 and 1.10, respectively, higher than the whites (0.98)[286] but exhibited a lower percentage of married women; 50.9%, 60.4% and 61.6% of the black, mixed and white women aged 15-54 years, respectively. The black women also experienced a higher number of unions. This could mean more unstable unions.[287] Primary sterilization might also be higher among them.

5.4.5 Marital Fertility and Fertility Control

As the 1950 census published a crosstabulation relating marital status to ethnic groups, it is possible to estimate total marital fertility rates and the Coale-Trussell indexes for 1940-45 in order to get some insight into the degree of fertility control. The results can be seen in Table 5.23 and they only refer to legally married women. Marital fertility was higher among black women followed by mixed races in all regions. This reinforces the hypothesis previously mentioned about lower chances of black women in the matrimonial market, even in Rio where the differences in nuptiality patterns were smaller. If they are in legal union, which probably means more stable union, black women would have higher fertility. White women showed the lowest marital fertility in all regions. The largest differences among ethnic groups were found in Rio de Janeiro. Black and mixed race women living in this area had higher fertility than comparable women in São Paulo.

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[286] They refer to the population aged 15-54.

[287] See Lazo (1988), pp 290-1.

Table 5.23
MARITAL FERTILITY AND INDEX OF FERTILITY CONTROL (*m*) BY ETHNIC GROUP
Brazilian Regions 1940-45

Regions	WHITE	MIXED	BLACK
TMFR			
Rio de Janeiro	6.6	10.0	11.9
São Paulo	7.4	9.4	9.5
Northeast	12.1	12.7	14.2
m			
Rio de Janeiro	0.800	0.542	0.561
São Paulo	0.511	0.311	0.438
Northeast	0.136	0.241	0.356
M			
Rio de Janeiro	0.789	1.131	1.358
São Paulo	0.826	0.979	1.033
Northeast	1.188	1.289	1.506
C_m			
Rio de Janeiro	0.530	0.465	0.377
São Paulo	0.634	0.613	0.532
Northeast	0.587	0.531	0.417

Source: 1950 Demographic Census

The index of fertility control, *m*, displayed in Table 5.23, suggests much stronger fertility control practised by white women in Rio compared to any other group. The estimates of the *M* value indicates that only white women in Rio and mixed races and whites in São Paulo exhibited fertility levels lower than the Hutterites standard. Black women exhibited a comparatively high *m* in all regions despite of very high marital fertility and a higher *M*. This suggests earlier stopping as it seems to have happened in São Paulo, where the ratio between the observed fertility and the standard fertility declined from 0.918 to 0.661 from the age group 25-29 to the 30-34. However, this does not seem indicate deliberate fertility control. It is more likely to indicate secondary sterilization or spousal separations. In the Northeast, the relative high fertility at early ages may have contributed for its high *m*. For instance, for the age group 20-24 the mentioned ratio was as high as 1.61. This questions the use of *m* as an indicator of fertility transition.

The estimate of the contribution of nuptiality to fertility, C_m, emphasises its importance in inhibiting fertility among black and mixed women, especially in Rio de

Janeiro. This played a very important role in ethnic fertility differentials in all regions. Table 5.24 shows total fertility rates for the three groups and three regions assuming that mixed and black women had the white women's C_m of their areas. The impact would be quite strong among black Northeastern and Rio women. They would have the highest fertility in their areas. Their fertility rate would have increased by 2.4 and 1.9 children, Northeast and Rio, respectively. The fertility of mixed races would also have increased but by a smaller fraction, 1.0 and 0.3 children, respectively. In São Paulo, the impact would not have been so marked and it be would more significant among mixed race women.

Table 5.24
TFR ASSUMING WHITE'S Cm
Brazilian Regions 1940-45

Regions	White	Mixed	Black
Rio de Janeiro	3.5	5.3	6.4
São Paulo	4.7	6.0	5.2
Northeast	7.1	7.4	8.3

Source: Table 5.23

Bercovich, based on special tabulations of the 1980 census for Rio and São Paulo, measured the index of marital fertility control, *m*, for 1975-80. Her results are shown in Table 5.25. They confirm the more advanced fertility control among white women, followed by mixed race women in both regions. They also suggest that fertility control was more intense in Rio for all ethnic groups. Compared to the 1940-45 results (see Table 5.23), these figures suggest an increase in fertility control among all women, especially among mixed race and white women in São Paulo.

Table 5.25
INDEX OF MARITAL FERTILITY CONTROL, *m*,
BY ETHNIC GROUP
Brazilian Regions 1975-80

Regions	White	Mixed	Black
Rio de Janeiro(1)	0.93	0.79	0.73
São Paulo(2)	0.89	0.64	0.58

Source: (1) Bercovich (1990), p 19
(2) Bercovich (n.d.), p 19

5.4.6 Ethnic Composition Impact on Fertility Levels

The ethnic composition of Brazilian population has shown large regional differences and has led to different reproductive behaviour. This can affect regional fertility comparisons. An attempt at measuring the impact of regional differences in ethnic composition on regional fertility differences is carried out through standardization. Total fertility rates for 1930-35 and 1940-45 standardized according to Rio de Janeiro ethnic composition are displayed in Table 5.26. The regional differences in fertility would have widened in the 1930s and 1940s if the ethnic composition was the same in all areas. The range of variation would be enlarged from 2.4 children to 3.1 in 1930-35 and from 3.0 to 4.0 in 194-45. The coefficient of variation would have also increased from 29.5% to 41.7% and from 41.1% to 58.7%, respectively. The largest impact would have been in the difference between Rio and São Paulo total fertility rates in both periods. This would have increased from 1.3 children to 2.2 in 1930-35 if the differentials in ethnic composition had been eliminated. In 1940-45, the variation would have enlarged from 0.7 to 1.9 children. This mean that regional differences in ethnic composition mask some of the regional differences in fertility.

Table 5.26
STANDARDIZED TOTAL FERTILITY RATE BY RIO DE JANEIRO ETHNIC COMPOSITION AND COEFFICIENT OF VARIATION (CV)
Brazilian Regions

Regions	Standardized	Observed
1930-35		
Rio de Janeiro	4.4	4.4
São Paulo	6.6	5.7
Northeast	7.4	6.7
CV (%)	41.7	29.6
1940-45		
Rio de Janeiro	3.8	3.8
São Paulo	5.7	4.6
Northeast	7.8	6.8
CV (%)	58.7	41.1

Source: 1950 Demographic Census

5.5 FERTILITY TRENDS BY INCOME GROUP

5.5.1 What is Known?

The relationship between fertility and income in Brazil has been extensively studied by among others, Rebello (1976), Berquó (1973), Carvalho and Paiva (1978), Merrick and Berquó (1983), Wood and Carvalho (1988), Oliveira (1984), Daly (1985), Bercovich (nd, 1990). Rebello' study is based on the 1970 census, considering Brazil as a whole. She concluded that there was an inverse relationship between income and fertility but only after income reaches a certain level. In this case, she divided the population into 15 income groups and estimated the fecundity rate for these groups according to residence. For urban areas, this rate increased until the sixth richest group and declined steadily after this point. In rural areas, the rates were higher and increased with income up to the tenth richest group and declined after that.[288]

Two others studies divided the country into ten regions and used the same data set as Rebello. Berquó (1973) included nuptiality, migration, literacy, the sex ratio and income per capita in a regression analysis and found out that income played a major role in determining the fertility of women aged 20 years and over. Carvalho and Paiva (1978) estimated total fertility rates according to income groups and their conclusions were similar to those of Rebello (1976). The increase in urban income resulted in fertility decline but only after income reached a certain level. For the lowest income groups, this relationship was positive. For the rural population, the relationship was much less clear. For instance, in new frontier areas the association was positive. Total fertility rates for the three studied regions by residence, estimated by them, are displayed in Table 5.27.

[288] See Rebello (1976), pp 416-20.

Table 5.27
TOTAL FERTILITY RATES BY FAMILY INCOME
Brazilian Regions 1965-70

Regions	Cr 1-10	Cr 11-150	Cr 151-300	Cr 301-500	Cr 501+
URBAN					
Rio de Janeiro	3.7	5.3	5.2	4.3	2.7
São Paulo	3.8	5.5	5.0	4.3	2.9
Northeast	6.8	7.8	7.6	6.4	4.0
RURAL					
Rio de Janeiro	7.1	7.5	7.5	6.9	4.2
São Paulo	6.3	6.3	6.5	6.5	5.0
Northeast	8.4	8.4	9.2	8.0	6.7
TOTAL					
Rio de Janeiro	4.0	6.2	5.4	4.4	2.7
São Paulo	4.2	5.9	5.4	4.5	2.0
Northeast	7.6	8.2	8.3	6.8	4.3

Source: Carvalho and Paiva (1978), p 37
Note: Cr = cruzeiro

Carvalho and Paiva considered five categories of monthly family income. Urban fertility increased until the second category and declined after that in all regions. In rural areas, fertility increased up to the third category. The largest impact on fertility produced by income was observed when income increased from the forth to the fifth group. This pattern was noticed in all regions except in the rural Northeast where the largest effect was in the movement from the third to the fourth category. The control for income did not affect regional differentials except for the third group in urban areas when São Paulo had the lowest fertility and the fifth in rural areas. In this case, among the richest rural population, Rio women had the lowest fertility.

Three types of coefficients of variation are calculated based on the TFRs shown in Table 5.27 and displayed in Table 5.28 The first one, *regional*, is an attempt at measuring the regional variation among comparable income groups within each region, using the TFR of Rio de Janeiro women as a point of reference. They are calculated by residence. The regional differentials are more marked in urban areas. They diminished when income increased up to the third group and increased after the fourth group. In rural areas, regional differences were lower and almost stable with slight fluctuations up to the fourth group when they increased dramatically. This might be partially associated with difficulties of measuring rural income. The second coefficient, *income*, measures variations provoked by income differences within each region. using the TFR of the highest income group of each region as a point of reference. These differentials were larger than those within each income group, especially in Rio de Janeiro. The combination of the two types of differentials is also displayed, *combined*. The combined coefficient was calculated taking Rio's lowest fertility as a reference.

Table 5.28
COEFFICIENTS OF VARIATION OF TFR BY FAMILY INCOME (%)
Brazilian Regions 1965-70

Type	Cr1-10	Cr11-150	Cr151-300	Cr301-500	Cr501+
Regional					
Urban	41.9	21.0	20.9	24.0	30.4
Rural	8.2	7.2	9.5	6.0	29.2
Income					
Rio de Janeiro		91.3			
São Paulo		77.8			
Northeast		78.4			
Combined		159.5			

Source: Table 5.27

Merrick and Berquó, using the 1970 Census and the 1976 PNAD analyzed the fertility decline for the same period by household monthly income. The urban population was divided into two economic groups for two regions; the Northeast and the combination of the states of Rio de Janeiro and São Paulo (Rio-SP). Their total fertility rates are displayed in Table 5.29. The fertility differentials were in the expected direction. The decline observed in urban areas was less rapid in Rio-SP than the Northeast since their rates were lower to begin with in 1970. In both areas, richer women experienced the largest decline. The greatest percentage decline occurred among high-income urban women in the Northeast, who in 1976 reached rates similar to the comparable Rio-SP group in 1970, 2.4. Similarly, the urban low and middle classes had fertility rates in 1976 close to rural Rio-SP women in 1970, 4.8. The lowest decline was observed among Northeastern rural women.

Table 5.29
TOTAL FERTILITY RATE BY TIME PERIOD AND ECONOMIC GROUP
Brazilian Regions

Time -Period	Rio-SP	Northeast
1970		
Urban/Middle	2.5	3.4
Urban/Low-Middle	3.9	5.4
Rural/All	4.8	6.4
1976		
Urban/Middle	2.0	2.4
Urban/Low-Middle	3.5	4.8
Rural/All	4.4	6.1
Percentage Decrease		
Urban/Middle	18.6	29.1
Urban/Low-Middle	8.8	10.4
Rural/All	8.3	5.2

Source: Merrick and Berquó (1983), p 74

Carvalho and Wood, based on the 1980 census and considering Brazil as a whole, found a straightforward negative relationship between total fertility rates and household income in both residence situations. In urban areas the fertility decline that took place in the 1970s was higher among the two poorest groups. In rural areas, the reverse was true. Large rates of change occurred among the two highest strata of monthly household income.[289] Oliveira came to the same conclusions for Rio de Janeiro and São Paulo, also based on the 1980 census but using per capita monthly family income. [290]

5.5.2 Fertility Differences

Figure 5.9 shows total fertility rates for five income strata based on the 1986 PNAD. They refer to the following categories of per capita family monthly income: <1/4 of the minimum wage; from 1/4 to 1/2 minimum wage; from 1/2 to 1 minimum wage; from 1 a 2 minimum wages and more than 2 minimum wages. It was not possible, however, to estimate the fertility rate for the first income group of São Paulo due to small

[289] See Carvalho and Wood, p 157.

[290] See Oliveira (1984), p 1853.

sample numbers. These estimates confirm the negative and straightforward relationship between fertility and income. Income played a very important role in the Northeast where the total fertility rate ranged from 7.1 to 1.9 from the poorest to the richest group. This effect is also important in São Paulo; when women moved from the fourth to the fifth richest group, their fertility dropped from 3.7 to 2.1. Although the last interval is more heterogeneous as it is an open interval, such dramatic changes were not found in Rio de Janeiro. The most marked change observed there was from the first to the second richest group.

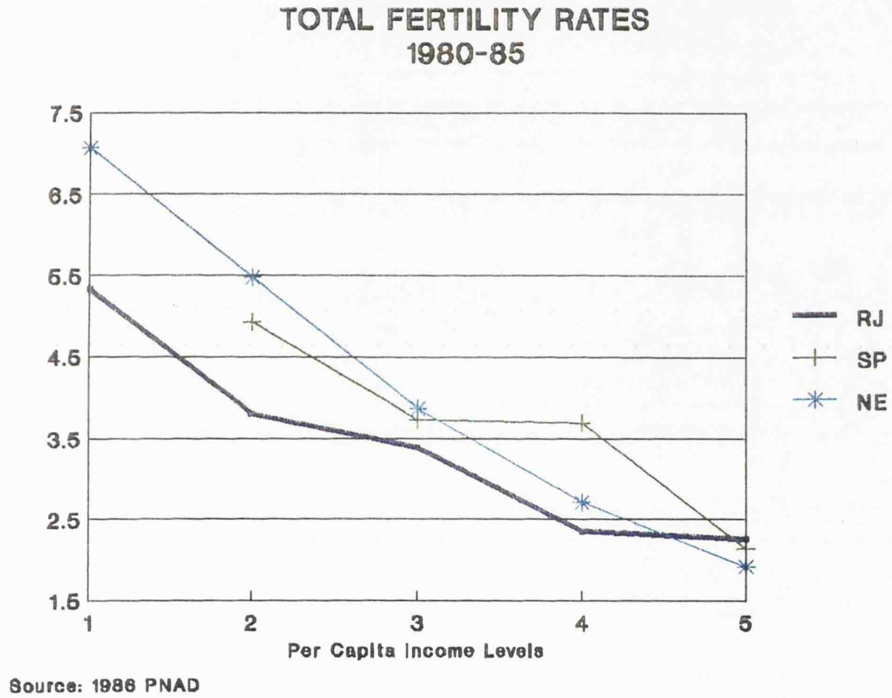

Figure 5.9

It is hard to discern a pattern in regional differentials according to changes in income. Table 5.30 displays three types of coefficients of variation; the *regional*, which measures the regional differences within each income group, the *income*, which estimates the effect of income distribution within each region and the *combined*, which combines the two types of differentials. The lowest variation in fertility by income groups was observed in Rio de Janeiro which is expected as fertility transition was in a more advanced stage there. At the other end of the transition, the largest difference was found in the

Northeast. A comparison of the two coefficients of variations, one which measures the fertility differentials in 1970 and the other which refers to 1986 points to a reduction in fertility differentials by income and residence from 459.5% to 212.1%.

Table 5.30
COEFFICIENTS OF VARIATION OF TFR BY PER CAPITA FAMILY INCOME (%)
Brazilian Regions 1986

Types	<1/4	1/4-1/2	1/2-1	1-2	2+
Regional	14.1	27.3	9.6	38.5	10.6
Income					
Rio de Janeiro	107.5				
São Paulo	132.8				
Northeast	250.8				
Combined	212.1				

Source: Figure 5.9

5.5.3 Income Composition Impact on Fertility Rates

The effect of regional differences in income composition on total fertility rates was measured through standardization, assuming Rio de Janeiro income composition for all regions. The results can be seen in Table 5.31. São Paulo women would have had their fertility increased and Northeast women would have had much lower fertility. Indeed, fertility in the Northeast would have been below that in São Paulo. The regional differentials would have been narrowed and even reversed but some would still persist. The fertility differential between Rio and São Paulo would have increased.

Table 5.31
STANDARDIZED TOTAL FERTILITY RATE BY RIO DE JANEIRO INCOME COMPOSITION AND COEFFICIENT OF VARIATION
Brazilian Regions 1980-85

Regions	Standardized	Observed
Rio de Janeiro	3.0	3.0
São Paulo	3.6	3.2
Northeast	3.4	5.2
CV (%)	14.7	98.8

Source: 1986 PNAD

Summarizing the results discussed here, it is clear that fertility transition started among rich women in urban areas and has been spreading to the remainder regions. At the start, the relationship was not clear among the lower classes and rural women but when the process advanced the income effect came to be stronger. The persistence of some regional differentials after controlling by income makes it hard to think of convergence in regional fertility rates.

5.6-FERTILITY TRENDS BY EDUCATION GROUP

5.6.1 What is Known?

Mortara was also one the pioneers of studies of the relationship between education and income. He found that for the ten states with the highest fertility rates the percentage of the population illiterate was 65.5% and for the ten with the lowest fertility, the comparable percentage was 59.7%. He concluded by noting the existence of a correlation between education and fertility, but said it was not strong.[291] Szmarescsany, based on a survey for the municipality of São Paulo in 1965, concluded by the key role that education played in the determination of urban fertility levels. She associates fertility differences by education to differences in mean age at marriage. This varied from 20.1 years among illiterates to 24.1 among those with higher education. The total fertility rate ranged from 4.2 among illiterates to 2.9 among those who had completed primary school. The percentage of ever married women sterilized increased from 4.1% among those with less than two schooling years to 11.2% among those who had completed primary school.[292]

Rebello, considering Brazil as a whole and based on the 1970 census, found a strong inverse relationship between education and prolificity. The mean parity of women aged 50-54 who had children ranged from 7.2 if they had no instruction to 2.8 if they had more than 13 years of schooling. No marked differences were observed if these measures are disaggregated by residence.[293] A similar conclusion was reached by Beisso, using the

[291] See Mortara (1954), pp 423-4.

[292] See Smarecsany (1977), pp 308 and 335.

[293] See Rebello (1976), pp 406-7.

same data set; the mean parity of women aged 15 and over ranged from 6.0 among the illiterates to 2.5 among those with more than 13 schooling years.[294]

Merrick and Berquó analyzed the Brazilian fertility decline during the first half of the 1970s by years of schooling and residence. They considered three education groups and concluded that urban fertility decline over 1970-76 was probably more rapid among women with less education leading to a narrowing of educational differentials among urban women. In contrast, for rural women, those with no education experienced the smallest decline leading to a widening in these differentials.[295] They also measured the mean number of children ever born by age group for currently married women living in rural areas of Rio and São Paulo, considered together, and in the Northeast. Their results are shown in Table 5.32. Women were grouped according to whether they had no education or reported any years of completed schooling. Average parity in 1970 was uniformly higher in the Northeast, with no apparent difference between those with none or those with some education. In 1976, differences by educational attainment also became observable as the fertility of women with some education declined and that of women with no education increased. The differentials seen in 1970 in Rio-SP were enlarged in 1976. At the same time, women's education increased. This definitely brought about further fertility decline.

[294] See Beisso (1981), p 83

[295] See Merrick and Berquó (1983), pp 61-7.

Table 5.32
MEAN NUMBER OF CHILDREN EVER BORN FOR CURRENTLY MARRIED WOMEN BY EDUCATIONAL ATTAINMENT AND AGE GROUP
Brazilian Regions

Time -Period	Rio-SP		Northeast	
	None	Some	None	Some
1970				
20-24	2.2	1.8	2.5	2.3
25-29	4.1	3.3	3.9	3.8
30-34	5.0	4.3	5.7	5.6
35-39	6.5	5.3	6.9	6.8
40-44	6.8	6.0	7.5	8.3
1976				
20-24	2.2	1.7	2.5	2.0
25-29	3.8	2.8	4.1	3.3
30-34	5.0	4.0	5.8	5.5
35-39	6.0	4.6	7.1	7.1
40-44	6.7	5.6	8.4	7.3

Source: Merrick and Berquó (1983), p 108

Another analysis of education's effect on fertility for Brazil as a whole through fertility cohort analysis was that made by Lam et al described in Chapter 1. They measured the impact of education on fertility trends and stressed the importance of schooling in producing a substantial decline in fertility. They claim to be able to explain from 50% to 90% of the fertility decline across recent cohorts by changes in the schooling of women and their husband. Nevertheless, they recognize that the precise mechanism which would explain the relationship between schooling and fertility is not clear. Expectations about the links between schooling, fertility, wages and the opportunity cost of time are confirmed at high levels of education, but not at low levels.[296]

5.6.2 Fertility Differences

Figure 5.10 displays total fertility rates according to four education groups based on the 1986 DHS. They refer to women's number of schooling years: less than two years; two to less than four complete years; five to seven completed years and eight and more

[296] See: Lam et al (1993), pp 22-6.

years.[297] These estimates confirm the negative relationship between fertility and education which was clearer in the Northeast. The pattern of regional differentials is the same after income is controlled with two exceptions. Rio women classified in the lowest education group showed higher fertility than the comparable women in São Paulo. This might, however, reflect some sample fluctuation. No differences were found between the fertility of the most highly educated women in São Paulo and the Northeast. In Rio, this group experienced fertility rates below replacement level. Compared to the previous category, the reduction was about 52.7%. A similar effect was apparent for Northeastern women.

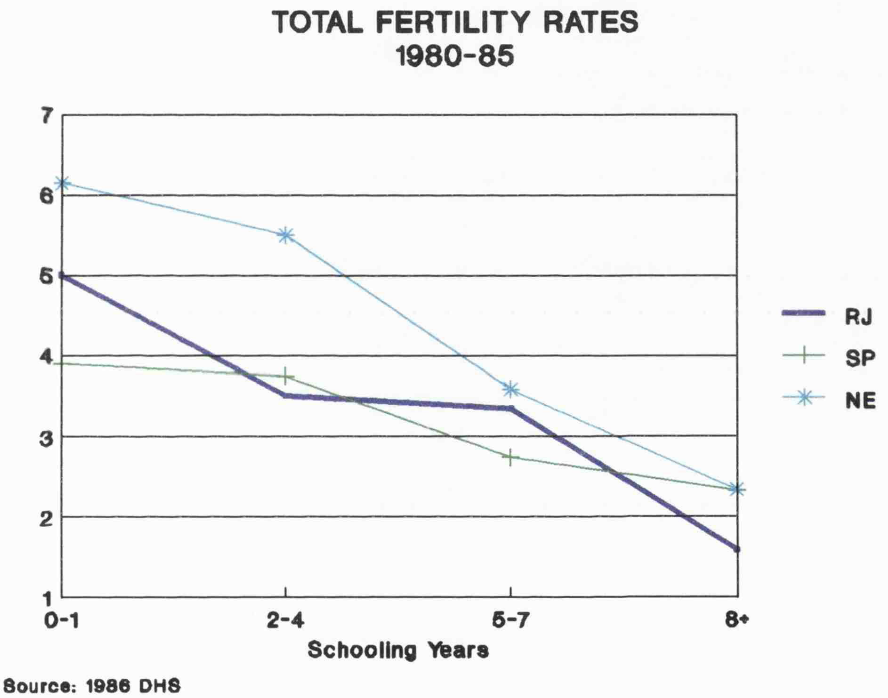

Figure 5.10

Regional differentials measured by the coefficients of variation within education group, *regional*, did not show a consistent pattern. They are broader among Rio de Janeiro women. The combination of the regional and educational variations, *combined*, is higher,

[297] This measures approximately, low education; half primary education; full primary education and higher than that.

368% than the comparable value for income groups, 212%, in the same year. See Table 5.33.

Table 5.33
COEFFICIENTS OF VARIATION OF TFR BY SCHOOLING YEARS (%)
Brazilian Regions 1975-80

Regions	< 2	2-4	5-8	8+
Regional	14.3	30.8	10.7	53.1
Within				
Rio de Janeiro	216.5			
São Paulo	61.0			
Northeast	143.9			
Combined	368.0			

Source: Figure 5.10

5.6.3 Determinants of Educational Differences in Fertility

Table 5.34 shows the percentage of ever married women using contraception taking into account those who were sterilized at the survey date and those who were on other methods based on the 1986 DHS. It also shows the Bongaarts' index of contraception. Due to small sample size, the results refer only to three educational groups: less than two years of school, two to four complete years and five and more.

Table 5.34
CONTRACEPTIVE USERS BY METHOD AND YEARS OF SCHOOL
Brazilian Regions 1986

Method	Rio de Janeiro	São Paulo	Northeast
% Sterilized			
Less than 2 years	xxx	xxx	20.7
2-4	31.3	29.0	27.8
5 and more	32.1	30.6	28.6
% on Other Methods			
Less than 2 years	xxx	xxx	20.3
2-4	34.2	42.9	29.6
5 and more	45.8	38.8	34.5
% Not Contracepting			
Less than 2 years	xxx	xxx	59.1
2-4	34.5	28.1	42.5
5 and more	22.0	30.5	36.9
C_c			
Less than 2 years	xxx	xxx	0.620
2-4	0.348	0.293	0.470
5 and more	0.233	0.313	0.421

Source: 1986 DHS
Note: xxx = sample numbers <30

The relationship between contraception and education is very clear in Rio de Janeiro and the Northeast. More educated women contracepted more. The increase in prevalence with education is a result of an increase in use of "other methods". Among all groups and regions, the highest prevalence rate was found among the more educated Rio de Janeiro women. Their preference was for "other methods". However, they also had the highest sterilization rate among all women. The lowest prevalence was experienced by the lowest educated women in the Northeast who had a slightly preference for sterilization over "other methods". The percentage of users increased dramatically from the lowest to the medium educational group. This increase was basically a result more women using methods other than sterilization.

The relationship between education and contraception is not very clear in São Paulo (see Table 5.34). The highest prevalence rate is found among medium level educated women who were more favourable to "other methods" than sterilization. The highly educated group had a lower prevalence rate but a slightly higher proportion of women sterilized than the medium educated group. Also, Morell did not find a clear association between prevalence and education in São Paulo. She considered women in union by five educational groups, using the 1986 PNAD. The prevalence rate increased from 56.4% among the lowest educational group to 72.7% among the third educated group. It declined to 68.1% and increased again to 70.0% among highly educated women. The percentage of sterilized women declined steadily with education, from to 31.3% to 21.5%.[298] The sterilization rate for São Paulo state in 1989 based on CPS data also pointed out higher sterilization rate among the poorly educated women, 18.6%. The comparable rate for the highest education category was 14.9%.[299]

Estimates of C_c are also calculated and shown in Table 5.34. They stress the importance of contraception in inhibiting fertility especially among the most highly educated women. Differences on nuptiality patterns by education also contributed to fertility differentials within and among the regions. This can seen in Table 5.35 through the mean age at first union and the proportion of women aged 15-44 married. Education led to a later onset of nuptiality and a reduction in the proportion of married women in São Paulo and the Northeast. In Rio de Janeiro, nuptiality seemed to be positively related to education.

[298] See Morell (1994), p 232.

[299] See Nakamura et al (1980), p 240.

Table 5.35
MEAN AGE AT FIRST UNION AND PROPORTION MARRIED BY YEARS OF SCHOOL
Brazilian Regions 1986

Regions	< 2	2-4	5+
Mean Age			
Rio de Janeiro	21.6	21.5	20.4
São Paulo	19.5	20.5	20.5
Northeast	18.9	20.2	19.4
% Married Aged 15-44			
Rio de Janeiro	45.8	61.7	60.6
São Paulo	7.0	65.2	43.5
Northeast	59.8	55.1	42.0

Source: 1986 DHS

5.6.4 Educational Composition Impact on Fertility Rates

Table 5.36 shows the total fertility rates standardized according to Rio de Janeiro's education composition. It may be seen the importance that regional differences in education composition have played in regional fertility differentials. As regional differentials in education composition are larger between the Northeast and the two other regions, Northeastern women would experience the largest reduction in their total fertility rate if the Rio women's educational composition was the same in all regions. However, they would still experience the highest fertility among the three areas. The direction of the São Paulo and Rio differentials would also be affected; the São Paulo fertility rate would be lower than that in Rio. The regional differentials measured by the coefficient of variation would be substantially reduced. Nevertheless, the effect of educational regional differences on fertility on does not seem so strong as that produced by income composition (see Table 5.31).

Table 5.36
STANDARDIZED TOTAL FERTILITY RATE BY RIO DE JANEIRO EDUCATION COMPOSITION AND COEFFICIENT OF VARIATION
Brazilian Regions 1980-85

Regions	Standardized	Observed
Rio de Janeiro	3.0	3.0
São Paulo	2.8	3.2
Northeast	3.6	5.2
CV (%)	13.0	98.8

Source: 1986 DHS

5.7- FERTILITY TRENDS BY WOMEN'S CURRENT WORKING STATUS

The relationship between fertility and women's working status is considered by the classic version of demographic transition to be an important aspect of modernization that brings fertility down. Although it has been very much studied, there is not a consensus about its importance in itself. First, most of the information analyzed is based on women's current work status instead of their work history. Secondly, this relationship is sometimes confounded by the effects of education. In Brazil, an extra element is added to the difficulty in understanding this relationship, that of the widespread employment of domestic servants. This is noted out by Camargo (1974), based on an analysis of survey data for Belo Horizonte. The presence of servants makes childbearing smaller obstacle to labour force participation by middle and upper class females than it would be in countries where child care facilities are less widespread.[300] Nevertheless, Rebello, based on the 1970 Census for Brazil as whole, found that the mean parity of economically active women was systematically lower than that for the non economically active for all age groups and residence situations. For instance, the value for women aged 50-54 was 5.6 for the economically active and 6.6 for the non economically active.[301]

Total fertility rates controlled by women's current work status, based on the 1986 DHS, are presented in Table 5.37. They point to a strong effect of women's working status

[300] Quoted in Merrick and Graham (1979), p 267.

[301] See Rebello (1976), p 422.

on fertility rates which was systematic in all regions. On average, the fertility of non working women was 63% higher than the working in all regions. Nevertheless, the relationship between women's work status and contraceptive prevalence, displayed in Table 5.38, is clearly in the other way around in Rio de Janeiro and São Paulo. Non working women contracepted more than working women. This meant sterilization as a higher proportion of working women were on "other methods". These figures refer to ever married women. This apparent contradiction might be explained by differences in age-structure, by the lag effect of recent increases in contraceptive use and also for the fact that sterilization seems to be the preferred method for higher fertility women. It is likely that non working women started using contraception more recently than working women and at higher parity. For the state of São Paulo, Morell found that the total contraceptive prevalence rate offsets differences in contraception prevalence by age groups. Among women aged 15 to 24, those who were working had a higher prevalence rate than the non working. Among older women, aged more than 40, this relationship was reversed. Among those in the intermediate age, she did not find important differences. Her conclusions are based on the 1986 PNAD data.[302]

Table 5.37
TOTAL FERTILITY RATES BY WOMEN'S WORKING STATUS AND COEFFICIENT OF VARIATION
Brazilian Regions 1980-85

Regions	No Working		Working	
	TFR	N	TFR	N
Rio de Janeiro	3.1	396	1.9	353
São Paulo	3.9	387	2.4	382
Northeast	6.8	1094	4.1	698
CV (%)	122.1		118.7	

Source: 1986 DHS

302 See: Morell (1994), p 258.

Table 5.38
CONTRACEPTIVE USERS BY MIX OF METHOD AND WOMEN'S WORKING STATUS
Brazilian Regions 1986

Method	Rio de Janeiro	São Paulo	Northeast
% Sterilized			
No Working	35.6	34.5	24.2
Working	25.3	23.0	24.7
% on Other Methods			
No Working	35.2	40.0	27.8
Working	42.7	41.5	29.4
% No Contracepting			
No Working	29.2	25.5	47.9
Working	32.9	35.5	50.6

Source: 1986 DHS

5.8-SUMMARY

The dramatic fertility decline in the three study areas was also a result of changes in the composition of the population by residence, ethnic and socio-economic group and more than that of a widespread decline among several socio-economic groups. This suggests a process of diffusion of the small family size but without implying a convergence of fertility rates among the regions or within regions. The differentials by the socio-economic variables considered here are still quite important. Several of them such as residence, income or education are more important than the regional ones.

The first variable considered here was residence. Cohort and period fertility measures point to a similar fertility pattern for urban areas of Rio and São Paulo: fertility declined, increased and declined again. However, the timing of these changes was regionally specific. Fertility decline was more intense in São Paulo in the first phase. In the Northeast, the first phase meant fertility stability. The phase of fertility increase was simultaneous in all regions and it was more marked in the Northeast followed by Rio de Janeiro. However, the birth cohorts in these two areas resumed fertility decline earlier than the São Paulo cohort. After this fertility decline was steady and more marked in Rio de Janeiro.

The pattern that emerged for rural fertility was less regionally homogeneous, although rural fertility also declined dramatically in all regions. Rio de Janeiro had the lowest total fertility rate among all urban populations but not a particularly low rural rate. Fertility increased there after a period of stability. Fertility decline began among the same birth cohort that resumed the urban fertility decline, the 1940-45 cohort. Fertility increased among the first eight rural Northeastern birth cohorts. After that it fell among a birth cohort five years younger than that who began the urban fertility decline. São Paulo women living in rural areas exhibited the lowest total fertility among all rural women since the 1920-25 birth cohort which in time period means approximately 1960-65. Fertility declined continuously there but with differentiated pace among the cohorts. The most marked decline was experienced by the cohort born in 1940-45. This occurred among cohorts five years older than those which resumed fertility decline in urban areas.

The onset of family formation is also differentiated by residence. In urban areas, the earliest onset was found among Northeastern women during all time periods but they also exhibited the highest percentage of single women. While the mean age at first union declined in all regions, the mean age at first birth increased except in São Paulo. This clearly suggests a reduction in pre-marital births. Earlier rural nuptiality seems to explain part of the rural-urban differentials in fertility but not the regional ones. This played an important role in raising rural fertility, especially in São Paulo. However, there, the highest nuptiality and the lowest total fertility rate was found in rural areas suggesting the existence of fertility control. Nuptiality increased in all rural areas and was also brought forward. The mean age at first birth changed in the same direction. As this was more marked in the Northeast, in 1986 Northeastern women exhibited the lowest mean age at first birth.

Although nuptiality explains part of the residence differences in fertility, the most important determinant of the fertility decline observed in the period was the increase in marital fertility control. This resulted in an earlier stopping of childbearing, measured by *m*. There is strong evidence that it started earlier in urban areas of Rio and was followed by urban São Paulo women and then by rural São Paulo women. It spread during the 1970-75 period to rural Rio and to the urban Northeast. There were also some indications of an increase in the importance of spacing as fertility decline advanced. In lower fertility areas such as the urban areas of Rio de Janeiro and São Paulo, the reduction in *M*, spacing, was more accentuated than those observed in *m*, stopping, during the 1970s. The progression to the third birth seemed to be an important element in distinguishing families who were in the process of fertility transition in urban areas. In rural areas, this was not so clear.

Migrants had higher fertility than the native population in areas of lower fertility and this also means areas of more inter-regional migration. Thus, immigrants in destination areas diminished the regional differentials which in 1980-85 were basically a result of differences in fertility of the native born population. Native Rio women had the lowest fertility among all women. As far as could be investigated, they tended to adopt native fertility level after some adaptation time. So, in the short run, they slowed down the fertility decline in their destination areas. It also seems that migration affected nuptiality and was partially responsible for the regional differences fertility rates by migration status. Earlier and also more intense nuptiality among São Paulo and Northeastern women were apparently the responsible factors for their higher fertility. In Rio, contraception prevalence was another important element in explaining fertility differences among migrants and the native born. It is likely that the lower nuptiality observed in the Northeast was an emigration result of a more marked male migration.

There were clear indications that white women in Rio de Janeiro had already started the fertility transition early in the century and were followed approximately two decades later by white São Paulo women. Apart from the Northeast, fertility declined among all ethnic group in this century but the pace of the decline was regionally and ethnically quite different: more intense among white women and no so marked among mixed race women. As a result, the fertility of white women was lower than the other two group in Rio and São Paulo since the 1940s. Fertility increased in the Northeast among all groups. Differences in the populations ethnic composition contributed to reduce regional fertility differences. The regional differences in fertility would be increased in the 1930s and 1940s if the ethnic composition was the same in the three areas. The largest impact would be in the difference between Rio's and São Paulo's total fertility rates in both periods. These would increase if the differentials in ethnic composition were eliminated.

In the Northeast and São Paulo in 1930-35, black women had the lowest fertility. This was also true in the Northeast in 1940-45. In Rio and São Paulo at that time, this group experienced lower fertility than mixed race women. It was suggested that black women were discriminated against in the matrimonial market. Although a crosstabulation relating marital status to ethnic groups was published only for the 1950 census, it was clear that this discrimination occurred in the legal marriage market at that time. They were more likely to be in informal unions. Considering all unions, the hypothesis of discrimination received some support in Rio and São Paulo. The mixed race women also seemed to be discriminated against, especially in São Paulo.

There is also evidence of an earlier stopping of childbearing among white women in Rio de Janeiro and São Paulo in 1940-45. This was stronger in Rio and indicates that the fertility differences between these two areas are a result of white women's fertility. It is likely that primary sterility had some inhibiting effect on fertility, especially among black women and that these played some role in fertility differentials. The largest impact was in Rio fertility, especially among black women. In the Northeast, apart from these factors it is likely that the fertility of black women was affected by higher male adult mortality, more unions disruption, higher intrauterine mortality or longer breastfeeding.

The relationship between fertility and income does not seem to follow a uniform pattern. A negative association between the two variables is clear and also the fact that fertility transition started among the rich women in urban areas and was spread among the remainders. When it started, the relationship was not marked among the lower classes and rural women but when the process advanced the income effect came to be stronger. Income composition played a very important role in regional differences in total fertility rates. Regional differentials would be strongly narrowed if these differences were eliminated, but there is still a component of fertility that might be explained by regional conditions. The persistence of some regional differentials after controlling by income makes it hard to think of convergence in regional fertility rates.

Differentials by education followed the same pattern as those by income. This was expected since the two variables are strongly correlated. Contraception played a very important role in explaining these differentials in Rio and the Northeast. The preference was for methods other than sterilization. The increase in prevalence with education is a result of an increase in "other methods". Later and less intense nuptiality were also significant in explaining these differentials, especially in São Paulo.

The last fertility differential analyzed was that due to women's current working status. Working women had much lower fertility than the non working. Nuptiality seems to explain part of these differences. Nevertheless, contraception rates were higher among non working women due to a higher rate of sterilization among them. This reinforces previous suggestions about the preference for sterilization among high fertility women. Working status does not show any effect on regional differentials.

Although fertility decline was widespread to most socio-economic groups, fertility differentials were still quite important in Brazil. It is difficult to draw a conclusion about fertility convergence towards very the low fertility such as that exhibited by Rio de Janeiro urban, white, rich and more educated women. The fertility rate is a outcome of interrelated variables such as contraception, nuptiality, primary sterility, breastfeeding, etc. It is not uncommon that socio-variables that bring about fertility decline through more contraception can bring about fertility increase by reducing sterility, stillbirths and so on. Furthermore, social change does not have equal consequences for all socio-economic groups. It seems that the fertility decline was caused by factors that were more or less specific to different sectors of the population.

Chapter 6
PATTERNS OF FAMILY FORMATION: differences or similarities?

6.1-INTRODUCTION

This chapter examines the patterns and timing of the family formation process in the three studied areas in more detail. The main question is whether the regional differences in reproductive behaviour can be attributed to divergence in the onset, spacing or stopping of reproduction. Regional fertility trends are examined from a birth order perspective. The family-building process is disaggregated into a series of stages, beginning with marriage and followed by first and successive births. The chapter is based on data from the Demographic Health Survey (DHS) undertaken in Brazil in 1986. The strategy adopted relies extensively on the calculation of life tables by birth order for subgroups of the sub-sample of ever-married women. Only births in the 15 years before the survey are taken into account.

To analyze patterns of family building, the use of birth intervals seem to be a good approach. As the available data consists of birth histories obtained from a survey, they present many methodological issues due to truncation and censoring. In this case, the most valuable method for studying parity-specific fertility behaviour seems to be the use of life table estimates of transition for each consecutive birth interval. The main procedures and the methodological basis used here for the construction of life tables by birth order are those presented by Rodriguez and Hobcraft (1980). Two aspects of family formation are examined: the *quantum* and the *tempo* of fertility. The *quantum* refers to the proportion of women who make the transition from one parity to the next and the *tempo* refers to the time a woman takes in this movement. This approach provides a means for determining if fertility change and regional differences can be attributed to changing reproductive patterns at low or high parities. One advantage of these estimates over synthetic rates is that they are cohort-based and therefore reflect the experience of actual parity cohorts.

The chapter is organized in eight sections including this introduction. Section 6.2 focuses on the onset of reproduction, here considered to be the first birth. The next four sections deal with the spacing of reproduction or in other words, the movements towards births of other parities. Section 6.3 provides the aggregate results of life table analyses by birth order and also considers the impact of age at first union and at first birth on subsequent birth intervals. Section 6.4 investigates the time effects (period and cohort) on the *quantum* and *tempo* of fertility. Further analysis by demographic variables, infant mortality and contraceptive prevalence, and by socio-economic variables, urban residence, migration, education and women's work status is offered in sections 6.5 and 6.6. Section 6.7 examines differences in the stopping patterns, as seen through age at last live birth and at sterilization. The final section summarizes the results.

6.2-THE ONSET OF REPRODUCTION

In this section, the attention is turned to regional variations in the onset of reproduction, regarding onset as the first birth. The measures presented here are life table measures of first birth. They refer to women's median age and to some indicators of the first birth interval. To aid interpretation and minimise the number of figures, most of the life tables results are reduced to B_0, B_6, B_9, the *quintum* or B_{60} and the trimean. B_0 measures the proportion of women with pre-marital births; B_6 indicates the proportion of women who gave births in the first six months of marriage or prior; B_9 indicates the cumulated proportion of women with pre-marital births and conceptions. The *quintum* or B_{60} is the proportion of women who had a birth within 60 months of marriage or a previous birth. This provides a reasonable estimate of the proportion of women who will have the first birth in societies which present high fertility levels.[303]

[303] See Rodriguez and Hobcraft, (1980), p 11.

6.2.1 Age at First Union and at First Birth

Figure 6.1 compares life table estimates of the median age at first union and first birth for the three regions. The date of first birth is widely considered to be more reliably reported than the date of first marriage.[304] Rio de Janeiro had later ages for both marriage and first birth. Compared with the Northeast, the difference was 1.3 years for the age at first union and 1.7 years for the age at first birth. The divergence compared to São Paulo was 0.8 years for the starting of union and 1.0 year for the starting of motherhood. The difference between age at marriage and age at first birth was larger in Rio (about 1 year), slightly smaller in São Paulo (0.9 years) and 0.7 years in the Northeast. This means that Rio de Janeiro women entered into unions later and had longer first birth intervals, especially compared with the Northeast.

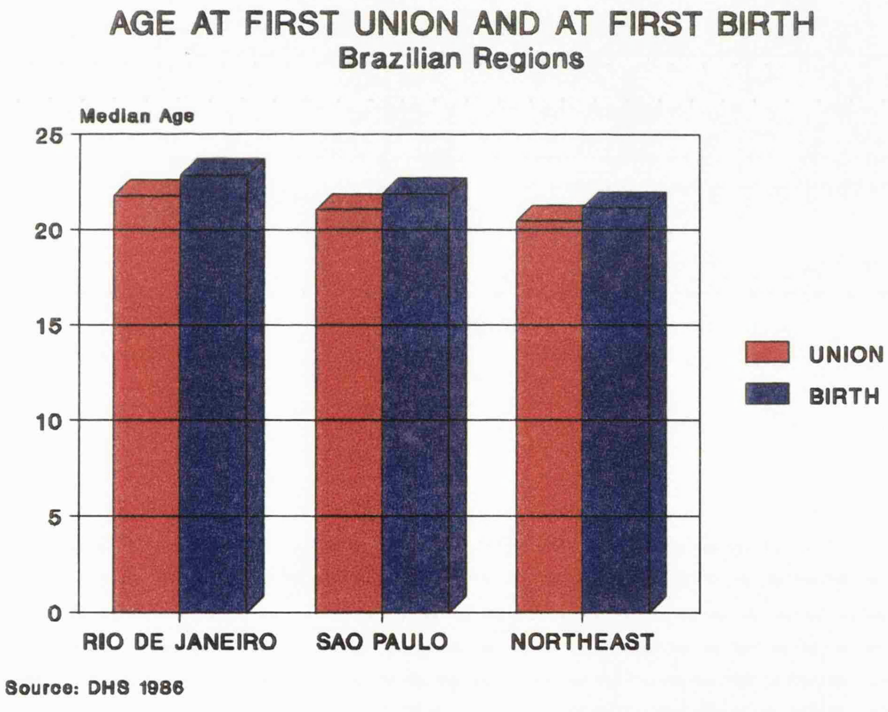

Figure 6.1

[304] See Hobcraft et al (1982).

There are some indications of a relationship between age at first marriage and age at first birth in Figure 6.1 with motherhood following marriage. Nevertheless, all the three regions had a considerable proportion of premarital births and conceptions, especially the Northeast. This can be seen in Table 6.1 which shows B_0, B_6, B_9 and the *quintum* or B_{60} from the calculated life tables for the first birth. The *quintum* values suggest that motherhood was virtually universal in the three areas. More than 90% of married women became mothers.

Table 6.1
SOME BIRTH FUNCTION VALUES (B_x)
Brazilian Regions 1986

B_x	Rio de Janeiro	São Paulo	Northeast
O	0.109	0.085	0.137
6	0.225	0.157	0.247
9	0.297	0.236	0.295
60	0.918	0.943	0.938
Trimean	15.1	14.7	12.8
N	506	490	1,172

Source: 1986 DHS

Table 6.1 also displays estimates of the trimean (T). This is an indicator of the *tempo* of fertility and is an approximate measure of the length of the birth interval. The formula suggested by Rodrigues and Hobcraft (1980) is applied in its calculation[305]. The length of the first birth interval measured by the trimean was approximately the same for Rio and São Paulo, 15 months, and about two months shorter in the Northeast. The most important regional difference was caused by the sequence of events. In the Northeast, 13.7% of ever-married women had at least one birth before marriage and a further 15.8% within the first nine months of marriage. Pre-marital fertility was less common in São Paulo and Rio de Janeiro (8.5 and 10.9%, respectively), but Rio showed the highest proportion of pre-marital conceptions.

[305] That is:

$$T = \frac{Q1 + 2Q2 + Q3}{4}$$

where Q_1, Q_2 and Q_3 are the quartiles of the standardised birth function when the *quintum*, $B_{(60)}$, is set to one. See Rodriguez and Hobcraft (1980), p 11.

6.2.2 Time Trends in the Onset of Reproduction

Period and cohort measures of the onset of reproduction are analyzed in this section. Table 6.2 shows time-period measures of the first birth interval beginning with median ages for women who had their first birth in 1980-86, 1975-80 and 1970-75 for the three regions. As the survey took place in 1986, the most recent period comprises six years in order to assure that women were exposed for an average of about three years. The measures indicate a postponement of entry into motherhood comparing the whole period in all regions. This actually occurred in the 1970s. The indicators for the early 1980s suggest that the first birth was brought forward in São Paulo and the Northeast, especially in the latter area where women came to start 1.2 years earlier.

Table 6.2
FIRST BIRTH INTERVAL MEASURES BY TIME PERIOD
Brazilian Regions

Period	Rio de Janeiro	São Paulo	Northeast
1980-86			
Median	22.3	21.5	20.5
B_0	0.145	0.128	0.135
B_9	0.356	0.349	0.335
Quintum	0.930	0.927	0.956
Trimean	13.7	12.2	12.7
N	148	143	353
1975-80			
Median	22.4	22.2	21.7
B_0	0.089	0.102	0.166
B_9	0.279	0.257	0.320
Quintum	0.928	0.956	0.947
Trimean	18.1	15.6	12.0
N	116	122	268
1970-75			
Median	21.4	20.8	20.2
B_0	0.100	0.073	0.115
B_9	0.287	0.206	0.237
Quintum	0.857	0.947	0.917
Trimean	14.6	14.7	14.1
N	128	134	327

Source: 1986 DHS

Life time measures of the first birth interval are also displayed in Table 6.2. To minimise numbers, B_6 values are not presented there. The results suggest that variations over time in the transition from marriage to first birth were defined by the proportion of pre-marital births and conceptions, B_0 and B_9. As both increased over time the length of the birth interval (the trimeans) declined. The *quintum* values also rose. The largest variation in premarital births and conceptions was observed in Rio de Janeiro during the early 1980s. This resulted in a 4.4 month reduction in the length of the first birth interval. This was also important in São Paulo where the reduction in the trimean was 3.4 months. Northeastern women also experienced a large rise in pre-marital births and conceptions somewhat earlier, during the 1970s. This contributed to a reduction of 2.1 months in the length of the first birth interval. An increase in the *quintum* was also observed. In 1970-75 there were almost no regional differences in the length of the birth interval. They increased in the following quinquennium and were reduced in the more recent period. Differences in the *quintum* were larger at the beginning of the period due to Rio's low *quintum*. Its increase narrowed the difference.

First birth interval measures disaggregated by age cohorts are displayed in Table 6.3. Three cohorts are considered here. The first two are defined by age at the time of the survey, namely 20-29 and 30-39. The third tries to measure the experience of the current 30-39 cohort when they were aged 20-29, i.e. ten years before the survey. The comparison of the two 20-29 cohorts indicates a rise in the median age at first birth in Rio and São Paulo. This is consistent with the period variations observed during 1970-75 and 1980-86. Among the 20-29 and 30-39 cohorts, the trend was for a reduction in the age at start reproduction which was more marked in the Northeast. This is also compatible with the period variations between 1975-80 and 1980-86 and might be a result of the increase of teen-age fertility, already noticed in Brazil.

Table 6.3
FIRST BIRTH INTERVAL MEASURES BY AGE COHORTS
Brazilian Regions 1986

Cohort	Rio de Janeiro	São Paulo	Northeast
20-29 at the survey			
Median	22.3	21.2	20.0
B_0	0.089	0.126	0.138
B_9	0.294	0.330	0.305
Quintum	0.911	0.956	0.954
Trimean	15.6	13.5	12.9
N	148	172	442
30-39 at the survey			
Median	22.9	21.4	21.5
B_0	0.124	0.069	0.139
B_9	0.292	0.180	0.290
Quintum	0.916	0.959	0.939
Trimean	14.7	15.6	12.8
N	208	192	213
20-29 ten years before the survey			
Median	20.6	20.3	20.2
B_0	0.106	0.039	0.117
B_9	0.281	0.129	0.257
Quintum	0.904	0.961	0.935
Trimean	14.7	15.5	13.7
N	123	121	313

Source: 1986 DHS

Life table measures of the first birth interval are also displayed in Table 6.3. They confirm the large increase in pre-marital births and conceptions in São Paulo and point to a reduction in the length of the birth interval by two months experienced by the youngest cohort. This was true when both 20-29 cohorts are compared and also when the comparison is carried out among the cohorts aged 20-29 or 30-39 at the survey data. The same was observed in the Northeast but only when the two 20-29 age cohorts are compared. The variation was less marked than that observed in São Paulo. The trends indicated by these cohorts are similar to those indicated by the period measures except in Rio de Janeiro. A reduction in pre-marital births, B_0, was observed there for both comparisons that is the two 20-29 cohorts and the 20-29 and 30-39 cohorts. However, only a slight variation was found in B_9 which suggests an increase in pre-marital conceptions. The first birth interval was longer among the youngest cohort.

6.2.3 The Impact of Age at Marriage on the First Birth

In this and the following subsections an attempt is made to investigate the impact of some demographic and socio-economic variables on the onset of reproduction. It starts by analyzing the effect of age at first marriage. An important problem of birth history analysis is that of selectivity. Due to the cross-sectional nature of the survey's design, intervals beginning at young ages are over-represented. The older cohorts in the sample could have had births at all ages while the younger cohorts could only have had them at young ages. Furthermore, births of the younger cohorts could only have taken place in recent periods while births to older cohorts can extend back at least 20 years. In this case, births to relatively older women represent a time period stretching back up to 15 years. Some of the extent of the selectivity biases can be examined by controlling for age at start the interval, as suggested by Rodriguez and Hobcraft (1980).

The rapidity of initial birth progression can probably be attributed to age-related characteristics. Age indicates birth-cohort and a variety of sociological and life-cycle processes. Young mothers are likely to be more fecund, to breastfeed and to abstain for shorter duration than older women. Women who are older at the beginning of the birth interval may have lower coital frequency, longer periods of breastfeeding, higher contraception prevalence or abortion rate. In this sub-section, age at first union is divided into four categories, corresponding to the quartiles of the age distribution at first union. The values of these quartiles are displayed in Table 6.4. The sizes of the resulting groups are somewhat uneven because the nearest age is used. Northeastern women showed the lowest values for each quartile and Rio de Janeiro women the highest value. Life tables for the first birth are calculated for each quartile.

Table 6.4
QUARTILE VALUES AND SAMPLE SIZE BY AGE AT FIRST UNION
Brazilian Regions 1986

Quartile	Rio de Janeiro		São Paulo		Northeast	
	Values	N	Values	N	Values	N
1	18	131	18	149	16	292
2	21	104	20	101	19	306
3	24	113	23	101	22	261

Source: 1986 DHS

The median age at first birth and the summary measures of the life table of the first birth by age at marriage are displayed in Table 6.5. The median age at first birth was strongly affected by age at marriage in all regions confirming the strong association between marriage and motherhood. A variation of about 10 years was observed in Rio de Janeiro and the Northeast and one of 8.8 years in São Paulo. The proportion of women who had their first birth by the end of the fifth year following marriage declined as age at marriage increased in Rio and São Paulo, roughly speaking. Rio de Janeiro showed the largest range of variation, from 97.2% to 87.8%. The highest *quintum* was observed among women married at age 20-23 years. On the other hand, women married over 23 years experienced the smallest *quintum* observed among all regions.[306] The variations in São Paulo were less marked, from 97.8% to 92.8%. Northeastern women married at 17-19 years experienced a large increase in *quintum* compared to the youngest married (married at age of 16 or younger) which suggests low fecundability by younger women. Women who married at older ages progressed less to the first birth as observed in Rio de Janeiro.

[306] These women also presented low B_{75} values (89%).

Table 6.5
FIRST BIRTH INTERVAL MEASURES BY AGE AT MARRIAGE
Brazilian Regions 1986

Quartiles	Rio de Janeiro	São Paulo	Northeast
< 1st			
B_0	0.023	0.055	0.092
B_9	0.204	0.218	0.225
Quintum	0.926	0.978	0.916
Trimean	18.4	14.4	15.3
Median	18.2	17.7	16.6
1-2nd			
B_0	0.083	0.063	0.117
B_9	0.283	0.239	0.266
Quintum	0.919	0.959	0.963
Trimean	14.5	14.3	13.4
Median	21.0	20.5	19.1
2-3rd			
B_0	0.171	0.104	0.157
B_9	0.365	0.235	0.320
Quintum	0.972	0.928	0.964
Trimean	13.2	15.3	12.0
Median	23.5	23.1	21.8
> 3rd			
B_0	0.152	0.115	0.227
B_9	0.321	0.255	0.428
Quintum	0.878	0.935	0.924
Trimean	14.0	13.8	9.6
Median	28.2	26.5	26.3

Source: 1986 DHS

Age at marriage noticeably affected the length of the first birth interval (see Table 6.5). Variations in the timing of the first birth are explained by variations in pre-marital births and conceptions. Pre-marital births increased in São Paulo and pre-marital conceptions declined with age at marriage. In Rio de Janeiro, an increase in the proportion of pre-marital births was observed, especially among women who married at 21-23 years (third quartile). This resulted in a reduction of the trimeans from 18.4 to 14.5 months when these women are compared with those married under 18 years. The Northeastern trimeans showed the largest fluctuation, from 15.6 to 9.6 months, as a result of a large increase in pre-marital births and conceptions.

6.2.4 The Impact of Early Contraception on the Onset of Motherhood

This sub-section focuses on the effect of starting contraception at an early stage of the life cycle on the onset of motherhood. It is also analyzed through life tables for the first birth interval. Women are classified in two groups: if they started contraception at parity zero, *planners*, or not, *other*. The results are displayed in Table 6.6. Early contraception played an important role in pre-marital births and conceptions and, consequently, in the timing of the first birth either measured by the trimean or by the median age at first birth. For instance, the use of contraception at an early stage was associated with a widening of the first birth interval by 9.3 months in Rio, 6.0 months in the Northeast and 4.8 months in São Paulo. This also resulted in a postponement of women's age at first birth by 2.6 years in Rio, 1.7 years in São Paulo and the Northeast. The proportion of pre-marital births and conceptions is significatively smaller among *planner* women compared to the *other*, especially in Rio de Janeiro. The regional difference in pre-marital births and conceptions were markedly reduced among *planner* women. So were the differences in trimeans between São Paulo and the Northeast.

Table 6.6
FIRST BIRTH INTERVAL MEASURES BY CONTRACEPTION STATUS
Brazilian Regions 1986

Status	Rio de Janeiro	São Paulo	Northeast
Planners			
B_0	0.076	0.064	0.093
B_9	0.205	0.200	0.203
Quintum	0.904	0.937	0.909
Trimean	20.4	17.7	17.7
Median	23.3	22.1	21.9
N	260	218	238
Other			
B_0	0.145	0.107	0.149
B_9	0.390	0.264	0.317
Quintum	0.935	0.951	0.944
Trimean	11.1	12.9	11.7
Median	20.7	20.4	20.2
N	246	272	934

Source: 1986 DHS

6.2.5 Onset of Childbearing by Socio-economic Variables

It is difficult to analyze the effect of socio-economic variables on the onset of motherhood using DHS data. Most of the variables collected refer to the current status of women at the time of the survey. The only variable that definitely refers to the period prior to motherhood is childhood place of residence. However, something similar might apply to education. By the time a woman is biologically able to reproduce, she had probably finished the primary education. For other variables such as migration, residence or working status, it is not possible to be sure about their time of occurrence, but even so, they are included in the analysis as they are expected to have some causal influence. The analysis starts with urban residence and migration status. Life table summary measures of the first birth interval are shown in Table 6.7. The number of observations is omitted to the tables to save space. However, all life tables are based on a minimum of 100 ever-married women. Due to a small sample size for women who grew up in towns and rural areas and also for those who were living in rural areas in Rio and São Paulo, the comparison made here is among current urban women and those who grew up in cities. It is assumed that women who grew up in cities are more homogeneous in term of urban values.

Table 6.7
FIRST BIRTH INTERVAL MEASURES BY URBAN RESIDENCE AND MIGRATION STATUS
Brazilian Regions 1986

Variables	Rio de Janeiro	São Paulo	Northeast
Urban Residence			
Childhood			
B_0	0.102	0.095	0.122
B_9	0.286	0.253	0.285
Quintum	0.923	0.944	0.922
Trimean	15.6	14.6	13.3
Median	22.9	22.1	21.3
Actual			
B_0	0.110	0.084	0.143
B_9	0.294	0.244	0.311
Quintum	0.920	0.943	0.936
Trimean	15.2	14.7	12.5
Median	23.0	22.0	21.1
Migration			
Migrant			
B_0	0.163	0.098	0.133
B_9	0.350	0.266	0.297
Quintum	0.918	0.965	0.940
Trimean	13.4	15.3	13.0
Median	22.2	20.0	20.3
Native Born			
B_0	0.095	0.079	0.150
B_9	0.283	0.297	0.287
Quintum	0.918	0.942	0.927
Trimean	15.4	14.5	12.4
Median	23.0	21.7	21.1

Source: 1986 DHS

The results in Table 6.7 show that women who grew up in cities did not behave differently from those who were currently living in urban areas as regards to the onset of reproduction. Only a slight effect on the length of the first birth interval was observed in Rio de Janeiro and the Northeast. In Rio, the trimean of women who grew up in cities was 0.4 months larger than that of currently resident women. In the Northeast, women who grew up in cities were less likely to have pre-marital births and conceptions than those living in urban areas. This widened the length of their first birth interval by 0.8 months.

For the Northeast it is possible to estimate a life table for women who grew up in towns or the country and compare these groups with those who were living in rural areas.

In this case, a more marked effect is found. For instance, women who grew up in towns or country had the first birth 0.8 years earlier than those who grew up in cities. Women who grew up in cities compared with those who grew up in towns or country had fewer pre-marital births and a birth interval of 1.4 months longer.[307]

The other variable considered in Table 6.7 is migration status. Migrants are defined as non-natives who had lived in the destination areas for less than ten years as in the previous chapter. The native population includes the native born and those migrants who had lived there for more than ten years. Migrants started childbearing about 0.8 years earlier than the native born except in São Paulo. The larger difference between Rio and São Paulo for the onset of reproduction is due to native born women's behaviour. Migrant women in Rio had higher proportions of pre-marital births and a birth interval two months shorter than native born women. In the Northeast and São Paulo a slight difference in the trimean is observed but in the reverse direction. Native women experienced a shorter birth interval than migrants.

Table 6.8 measures the effect of women's working status and women's education on the median age at first birth, the *quintum* and the length of the first birth interval. The available information for women's working status refers to their current status. Women's work status generates important differences in the median age at first birth in the Northeast and Rio de Janeiro by 1.9 and 1.7 years, respectively. In São Paulo the differential was smaller and in the reverse direction. It is important to be aware that the data does not allow an inference to be made about the direction in which the causation runs. It is also possible that mothers are less prone to work outside home. Apart from the Northeast, a lower proportion of workers became mothers. Working women had more pre-marital births than the non working. This was more noticeable in São Paulo. Thus, a shorter trimean, almost two months, is observed in this area. In the other areas, workers experienced a longer first birth interval. The largest variation was observed in the Northeast, about 2.1 months.

[307] Data not shown.

Table 6.8
FIRST BIRTH INTERVAL MEASURES BY WOMEN'S WORKING STATUS AND EDUCATION
Brazilian Regions 1986

Variables	Rio de Janeiro	São Paulo	Northeast
Working Status			
No Working			
B_0	0.107	0.068	0.134
B_9	0.292	0.222	0.298
Quintum	0.932	0.958	0.946
Trimean	14.9	15.4	12.9
Median	22.1	21.8	20.3
Working			
B_0	0.112	0.084	0.143
B_9	0.303	0.257	0.292
Quintum	0.905	0.924	0.946
Trimean	15.6	13.6	15.0
Median	23.8	21.4	22.1
Education			
< 2			
B_0	xxx	xxx	0.177
B_9	xxx	xxx	0.355
Quintum	xxx	xxx	0.943
Trimean	xxx	xxx	11.0
Median	xxx	xxx	19.4
2-4			
B_0	0.113	0.088	0.139
B_9	0.285	0.172	0.282
Quintum	0.927	0.956	0.949
Trimean	13.5	14.5	13.2
Median	21.1	20.4	20.4
5 and more			
B_0	0.093	0.073	0.079
B_9	0.274	0.227	0.223
Quintum	0.913	0.938	0.915
Trimean	17.6	16.4	15.7
Median	23.9	23.1	22.8

Source: 1986 DHS
Note: Sample size < 100

Education is analyzed using three educational groups: less than two years of school, two to four complete years and five and more years. Table 6.8 shows the median age at first birth and summary measures of the life tables for the first birth. Among all variables analyzed, education produced the strongest impact on the onset of reproduction.

The age at first birth increased steadily with education. The largest impact was observed in Rio where highly educated women started 2.6 years later than the medium educated. In the Northeast, the variation was 1.9 years and in São Paulo 1.1 years.

It may be seen from Table 6.8 that Northeastern lowly educated women had a substantially higher incidence of pre-marital births and conceptions than women with high education and also a shorter first birth interval. Another important impact was on *quintum* values there and in Rio de Janeiro. Highly educated women had less chance of becoming mothers. In Rio, the variations were in the same direction as in the Northeast. The largest impact was observed on the length of the birth interval. In São Paulo, the relationship was not so straightforward. There, the transition from 2-4 to five and more years of school resulted in a slight reduction in pre-marital births and an increase in pre-marital conceptions. The trimean was enlarged by 1.9 years. The regional differences were in the same direction.

Considering the whole set of variables, it is possible to speak of universality of motherhood among married women, in spite of the regional and socio-economic differences in the pattern of first birth. Most of the *quintum* values presented values higher than 90%. Highly educated women and those who married later had less chance of becoming mothers. Rio de Janeiro women started reproduction later either measuring by the mean age at first birth either by the first birth interval The reverse occurred in the Northeast where the highest proportion of pre-marital births and conceptions was also observed. The time effect and that produced by the socio-economic variables were more intense on pre-marital births and conceptions which affected the length of the first birth interval. The regional differentials on the onset of reproduction were not altered when the indicators were controlled by socio-economic variables.

6.3- SPACING PATTERNS

This section looks at spacing among births of high parity. Life tables for births of parities up to five are calculated using the sub-sample of ever married women who had births in the last 15 years before the survey. It is analyzed the effect of age at first union and at first birth as well. Presented here are estimates of the *quintum* or B_{60} and the trimean. For each parity only a sub sample of 100 or more women is considered.

6.3.1 General Behaviour

Figure 6.2 presents the *quintum* values by parity one to five for the three regions. The small sample number prevented the calculation of life tables for parities higher than four for Rio de Janeiro and higher than five for São Paulo. As seen before, there were no significant differences between the probability of progression from marriage to first birth within 60 months in any of the three regions. Even $B_{(75)}$ values do not show notable differences by regions.[308] In Rio and São Paulo, a decline in the probability of closing an interval from parity two up parity four can be observed. These probabilities suggest that family limitation started at parity two and that parity exerted an influence on reproductive behaviour. The increase in the proportion of women progressing to the fifth child in São Paulo might be interpreted as a selectivity effect. These probabilities are conditional upon having reached the previous parity and the high parity women are drawn from older age cohorts being selected for rapid and early childbearing and belonging to certain socio-economic groups. Probably, these cohorts had not yet changed their reproductive behaviour. When younger age cohorts reach higher parities their transition rates will probably be substantially lower than those seen in Figure 6.2. Clear variations among the *quintum* of diverse parities in the Northeast were not found.

[308] The *quintum* values are 0.934; 0.953 and 0.952 for Rio, Sao Paulo and Northeast, respectively.

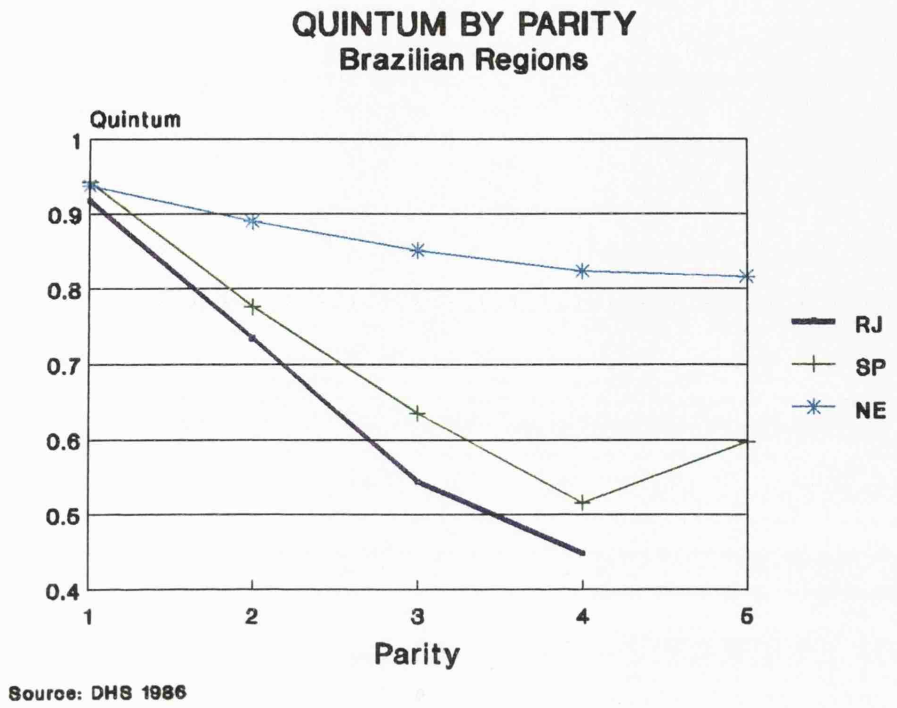

Figure 6.2

Regional differences increase as parity increases. The most significant difference between Rio and São Paulo was in the transition from the second to the third birth. About 54.1% of Rio de Janeiro women with two children progressed to the third birth. In São Paulo, the comparable proportion was 63.5%. Comparing the Northeast with the others, the most marked contrast was in the transition to the fourth parity. The proportion of women with three children who progressed to the fourth birth was remarkably high in the Northeast (82.3%) and transitions from parity four to parity nine were stable around 82%. The only clear variation was that observed from parity six to seven (see Table 6.9). This suggests very little or no parity control there.

Table 6.9
***QUINTUM* AND TRIMEAN BY PARITY**
NORTHEAST 1986

Parity	*Quintum*	Trimean
1	0.938	12.8
2	0.890	23.6
3	0.851	23.0
4	0.823	23.4
5	0.816	22.3
6	0.829	24.7
7	0.781	25.2
8	0.846	23.0
9	0.826	23.7

Source: 1986 DHS

Figure 6.3 presents estimates of the interval length, the trimean. It shows that the speed at which births of any order occur was faster in the Northeast than in Rio de Janeiro or São Paulo. Apart from the first birth, it seems that childbirth was concentrated between two and two and half years after the start of the interval in Rio and São Paulo. The longest birth interval occurred in the transition from the second to the third birth in Rio de Janeiro, 31.8 months. In São Paulo, the highest value was found for the transition to the fourth birth, 29.6 months. In the Northeast, the interval between births was slightly below two years for all parities up to five. The longest interval was that between the sixth and seventh birth, 25.2 months. Roughly speaking, all regions showed an increase in the interval length as parity increases.

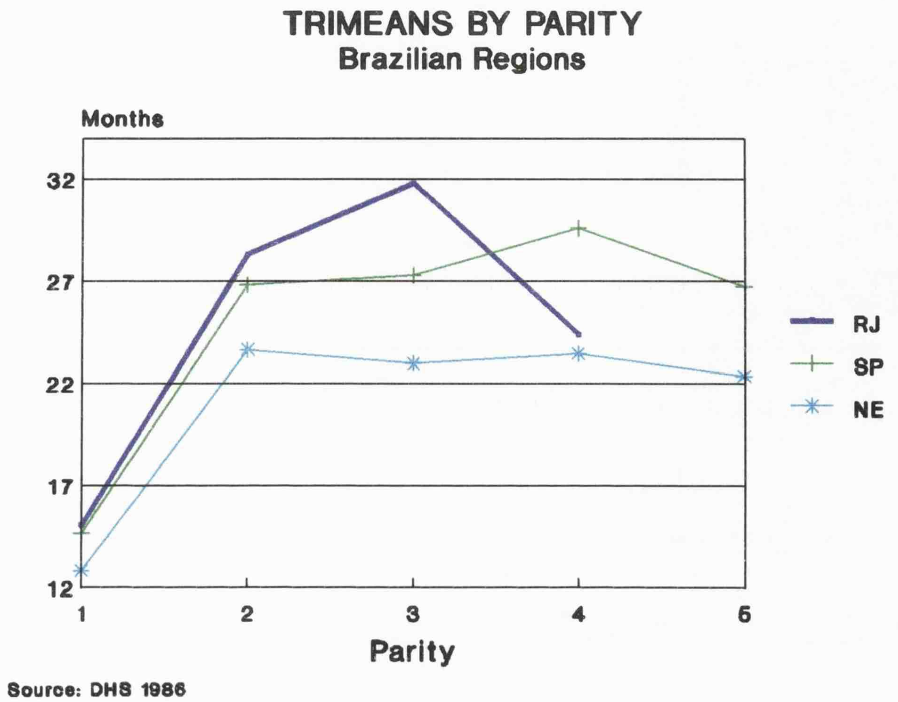

Figure 6.3

These results suggest that transition rates and spacing between births played an important role in the regional fertility differences. Rio women showed lower *quintum* and lower spacing. Quite the reverse occurred in the Northeast. The general trend of a lower proportion of women having a subsequent birth seems compatible with the classical view of theory of fertility transition. In this, a fall is assumed to occur first in transition rates at high parities and gradually filters down to lower parities. The *quintum* indicates only the probability of a woman having a subsequent child within five years. It is expected to find an increase in the trimeans as parity increases which is associated with of an advanced stage of fertility decline. This was clear only in Rio de Janeiro. Nevertheless, the sharp decline observed in *quintum* at parity three in São Paulo suggests future changes in the *tempo* of fertility there.

6.3.2 The Effect of Age at Starting Marriage on Birth Intervals

As previously outlined, birth history data are selective leading to an over-representation of intervals beginning at young ages. This sub-section looks at the effects of age at marriage on the second and third birth intervals. The same grouping of age at marriage used in section 6.2 is used in this section. Small sample size does not allow the estimation of life tables for parities higher than three. The *quintum* (Q_2 and Q_3) and trimeans (T_2 and T_3) obtained from the life tables for the second and third parity, respectively, by age at marriage are displayed in Table 6.10. The effect of age at marriage on the *quantum* and *tempo* of fertility became more marked at higher parities; a consistent decline in *quintum* and an increase in trimeans occurred. However, this effect was regionally distinct.

Table 6.10
***QUINTUM* AND TRIMEAN BY AGE AT MARRIAGE**
Brazilian Regions 1986

Quartiles	Rio de Janeiro	São Paulo	Northeast
Q_2			
< 1st	0.817	0.725	0.907
1-2nd	0.694	0.754	0.888
2-3rd	0.647	0.729	0.884
> 3rd	0.637	0.728	0.831
Q_3			
< 1st	0.688	0.648	0.862
1-2nd	0.568	xxx	0.911
2-3rd	0.482	0.612	0.803
> 3rd	0.421	0.523	0.789
T_2			
< 1st	26.8	27.1	24.1
1-2nd	28.2	25.7	23.6
2-3rd	29.9	29.5	22.7
> 3rd	27.8	30.9	25.0
T_3			
< 1st	28.4	26.6	22.6
1-2nd	31.2	xxx	22.0
2-3rd	32.0	34.4	24.5
> 3rd	34.2	33.3	23.2

Source: 1986 DHS
Note: Q_2 - *quintum* of second parity
Q_3 - *quintum* of third parity
T_2 - trimean of second parity
T_3 - trimean of third parity

The effect of age at marriage on the *quantum* of fertility is very clear in both parities analyzed in Rio de Janeiro. The chance of a woman having a second birth declined from 81.7% to 63.7% if she married under 17 years of age or over 23 (see Table 6.10). A similar effect was observed at the progression to the third parity. This probability ranged from 68.8% to 42.1%. Age at marriage also had a considerable impact on the trimeans, especially those of the third birth interval. They increased as age at marriage increased. The range of variation in the length of the second birth interval was 3.1 months and that of the third was 5.8 months. The variations in the trimean for the second birth were not quite uniform as they declined for the oldest married group. This suggests that women who started later and wanted to progress to higher parities did it faster.

In São Paulo, the impact of age at starting unions on the *quintum* is not very clear for the second parity (see Table 6.10). The transition rates were stable around 73% except for women who married when they were 17-19 years who also had the highest *quintum* and the shortest birth interval. This may suggest low fecundity among the youngest married group, those less than 17 years. The impact of age at marriage was much more marked in the third interval in both *quintum* and trimeans. The proportion of women having a third birth ranged from 64.8% to 52.3% and the length of the birth interval increased by 6.7 months.

Although the *quintum*'s scope of variation was somewhat noticeable in the Northeast for both parities, variations in the length of the interval were not so significant (see Table 6.10). The *quintum* for second parity ranged from 90.7% to 83.1% and that for the third parity fluctuated from 86.2% to 78.9%. Variations on trimeans were not clear. The length of the second interval decreased among the first three groups of women and increased among the old married group. Measures of the third birth interval were more irregular than those for the second. It declined, increased and declined again.

Variations on *quintum* by age at marriage seem to confirm the association described in the literature among early marriage, higher completed fertility and shorter birth intervals. Nevertheless, its effect was much more marked in Rio than in São Paulo or the Northeast. This accentuated the regional differences in *quintum* values among women married at older ages.

6.3.3 The Effect of Age at Starting Motherhood on the Second Birth Interval

It is also suggested that early fertility is associated with high fertility. The analysis of the effect of age at first birth on the second birth is carried on as in the previous section, considering four categories of ages at first birth; these correspond to the quartiles of the distribution. Then, life tables for the second birth order are calculated separately for those categories. The approximation of the quartile values and sample sizes are presented in Table 6.11. The sizes of the resulting groups are again somewhat uneven because the nearest age is used. The *quintum* values are shown in Figure 6.4 and the trimeans in Figure 6.5. The results indicate that the effect of age at first birth on the *quintum* and *tempo* of fertility is similar to the effect caused by age at marriage, a decline in *quintum* and an increase in the trimeans occurred when motherhood started later.

Table 6.11
QUARTILE VALUES AND SAMPLE SIZE BY AGE AT FIRST BIRTH
Brazilian Regions 1986

Quartile	Rio de Janeiro		São Paulo		Northeast	
	Values	N	Values	N	Values	N
1	19	105	18	124	16	295
2	21	130	20	102	19	270
3	25	108	24	108	22	298

Source: 1986 DHS

Figure 6.4 indicates that the probability of a woman having a second birth in Rio de Janeiro was strongly affected by her age at first birth. The *quintum* ranged from 0.843 to 0.642. Variations on trimeans were also marked (Figure 6.5). Rising age at first birth produced an increase of about six months in the second birth interval. However, the oldest married women experienced a shortening in this length which suggests that older women progress faster, if they do. The São Paulo *quintum*'s scope of variation was more marked than Rio's but the pattern was not consistent. Women aged 19-22 years at the first birth showed much lower transition rates whereas the oldest women had higher rates. This outcome may reflect a time period effect or sample fluctuations. In the Northeast, the effect of age at motherhood was seen only in the *quintum* as the range of variation of the trimean was only 0.7 months.

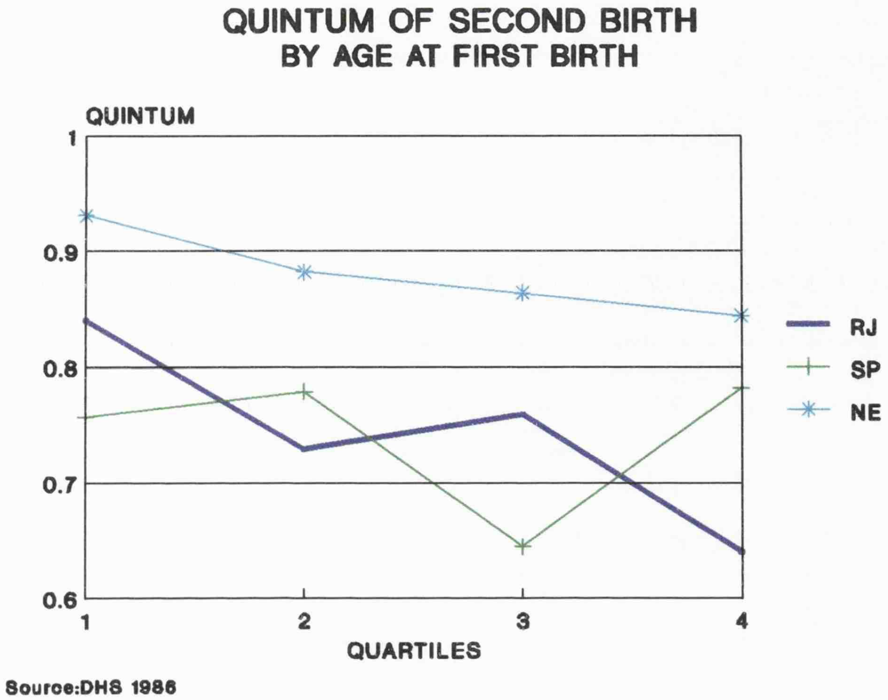

Figure 6.4

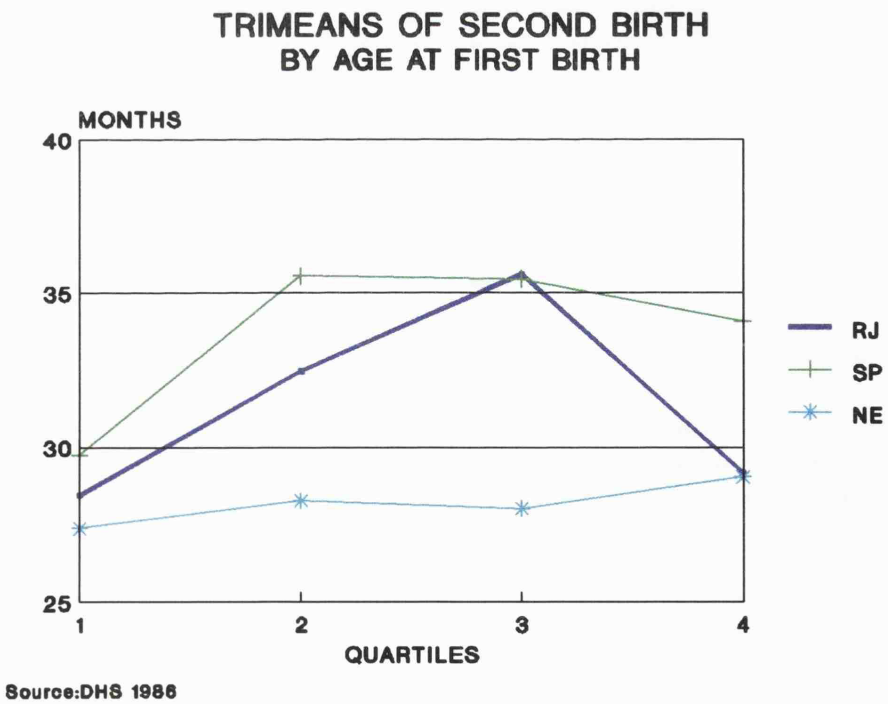

Figure 6.5

The regional differentials are not clearly affected when age at first birth is controlled. However, women classified in the first and third quartiles in Rio de Janeiro and São Paulo showed reversed differentials. These findings also roughly confirm the literature; age at first birth affected the reproductive behaviour of the three areas but the impact was regionally diverse. They do not explain the regional differences in the *quintum* or trimean values. They do, however, suggest that this effect is much stronger in areas where fertility decline is more advanced.

6.3.4-The Effect of Age at Starting the Second Birth Interval on the Third Birth

This sub-section looks for the effect of women's age at second birth on the third birth interval. Due to small sample numbers for Rio de Janeiro and São Paulo, only two groups of age categories are analyzed. They are chosen according to the median of each distribution of age at starting the second interval. The methodology of life tables for birth intervals are again used for the estimation of *quintum* and trimean values. The results are displayed in Table 6.12 as well as the approximation of median values used for the classification of the two groups. The impact of age at starting the second birth intervals was similar to that produced by age at marriage or first birth. The *quintum* of the third birth declined and the trimean increased in all regions. The largest impact on *quintum* values was again experienced by Rio de Janeiro women. São Paulo women experienced the largest variation in trimeans. The regional differences in *quintum* values increased with age at start the interval and that between Rio and São Paulo declined when the trimeans are taking into account.

Table 6.12
***QUINTUM* AND TRIMEAN OF THE THIRD BIRTH BY MOTHER'S AGE AT THE SECOND BIRTH**
Brazilian Regions 1986

Median	Rio de Janeiro	São Paulo	Northeast
Quintum			
< Median	0.635	0.687	0.901
> Median	0.496	0.567	0.811
Trimean			
< Median	30.0	27.3	22.0
> Median	33.0	31.7	24.0
Median	24.2	23.5	22.3

Source: 1986 DHS

6.4- TIME TRENDS IN BIRTH INTERVALS

Once again, trends over time in birth intervals are studied using life tables by birth order. They refer to the period in which the interval started and to three different age cohorts of women as in section 6.2. Two cohorts are defined by age at the time of the survey and another by age ten years prior to the survey.

6.4.1- Period Effects on Birth Interval

Time periods are classified in three categories, 1970-75, 1975-80 and 1980-86. Due to small sample numbers for Rio de Janeiro and São Paulo, the highest parity analyzed for these areas is the third parity. The analysis for the Northeast extends to the fifth birth. Table 6.13 displays the *quintum* values for the three areas by the three time periods. The results suggest that the greatest fertility decline that took place in all regions was a result of reductions in transition rates at parities higher than the first. Interestingly, while women in all regions were having less children at high parity, more women in Rio and the Northeast were becoming mothers. Only São Paulo women experienced a reduction in the *quintum* of the first birth in 1980-86. Even so, it increased in 1975-80 compared to 1970-75. The trend of fertility reduction begins to emerge from the transition to the second birth..

Table 6.13
***QUINTUM* VALUES BY TIME PERIOD AND PARITY**

Parity	Rio de Janeiro	São Paulo	Northeast
1980-86			
1	0.930	0.928	0.956
2	0.641	0.659	0.749
3	0.312	xxx	0.682
4	xxx	xxx	0.661
5	xxx	xxx	0.654
1975-80			
1	0.927	0.956	0.948
2	0.683	0.736	0.878
3	0.551	xxx	0.883
4	xxx	xxx	0.797
5	xxx	xxx	0.815
1970-75			
1	0.857	0.933	0.917
2	0.742	0.831	0.923
3	xxx	xxx	0.860
4	xxx	xxx	0.884
5	xxx	xxx	0.848

Source: 1986 DHS
Note: sample size <100

The period trends point to a reduction in the regional differentials in the progression to the second birth. The largest decline in *quintum* occurred in the transition to the third birth in the most recent period, either in Rio and the Northeast. Only 31.2% of Rio's women who had the second birth progressed to the third in the more recent period. In the Northeast, this probability was 68.3% indicating an increase in the regional differences at this parity. During the 1970s the most marked reduction in *quintum* experienced by Northeastern women was in their progression to the fourth birth. The results confirm that fertility transition started earlier in Rio de Janeiro and suggest that a dramatic reduction in family size occurred there.

The timing measures, represented by the trimeans in Table 6.14, do not indicate as consistent changes as those observed in the *quantum* of fertility. This suggests limitation of births rather than spacing among births as the main factor responsible for the fertility decline. As seen previously, the length of the first interval was shortened in all regions. The length of other birth intervals widened over time except for the third birth interval in

Rio de Janeiro which was reduced in the last period. This might be a selectivity effect caused by the incompleteness of experience; probably, women who completed this interval were selected for short birth intervals. Considering the whole period, Northeastern women experienced a large increase in the second trimean, 4.9 months, and a somewhat smaller one in the third, 2.0 months. The second birth interval of São Paulo women was dramatically enlarged in the second half of the 1970s.

Table 6.14
TRIMEAN VALUES BY TIME PERIOD AND PARITY
Brazilian Regions 1986

Parity	Rio de Janeiro	São Paulo	Northeast
1980-86			
1	13.7	12.2	12.7
2	29.5	32.7	26.2
3	25.9	xxx	24.5
4	xxx	xxx	23.0
5	xxx	xxx	23.0
1975-80			
1	18.0	15.6	12.0
2	27.7	36.0	24.4
3	33.7	xxx	23.4
4	xxx	xxx	23.4
5	xxx	xxx	22.7
1970-75			
1	14.6	14.7	14.1
2	28.0	26.0	21.3
3	xxx	xxx	22.5
4	xxx	xxx	23.0
5	xxx	xxx	22.1

Source: 1986 DHS
Note: sample size <100

6.4.2 Cohort Effects on Birth Intervals

The childbearing experience of different cohorts of women are also studied using summary measures of life tables by birth order constructed separately for two categories of age at the time of the survey, namely 20-29 and 30-39 and also for the cohort aged 20-29 ten years before the survey. The experience of the younger cohorts was not complete at the time of the survey and this resulted in small sample numbers for Rio de Janeiro and São Paulo. Thus, the analysis for the youngest cohort is restricted to the first two intervals in Rio and the first three in São Paulo. The measures presented in Table 6.15 confirm the decline in the *quantum* of fertility showed by time period analysis. The largest decline in the *quintum* occurred in the transition to the second birth in Rio for both comparisons carried out as there were no measures for parities higher than this. In São Paulo, the most marked decline is also seen in the transition to the second birth when the two actual age cohorts are compared. If the two 20-29 cohorts are contrasted, the largest variation was in the transition to the third parity. For both comparisons, a dramatic decline in all Northeast's transition rates was observed except in the first one. The largest decline was seen in the third progression.

Table 6.15
***QUINTUM* VALUES BY AGE COHORT AND PARITY**
Brazilian Regions 1986

Age Cohort	Rio de Janeiro	São Paulo	Northeast
Aged 20-29 at the time of survey			
1	0.911	0.956	0.954
2	0.672	0.705	0.867
3	xxx	0.568	0.790
4	xxx	xxx	0.816
5	xxx	xxx	0.780
Aged 30-39 at the time of survey			
1	0.916	0.959	0.939
2	0.728	0.795	0.898
3	0.535	0.611	0.854
4	0.429	0.469	0.823
5	xxx	xxx	0.798
Aged 20-29 ten years priori the survey			
1	0.904	0.961	0.935
2	0.808	0.797	0.926
3	0.636	0.697	0.879
4	xxx	xxx	0.909
5	xxx	xxx	0.840

Source: 1986 DHS
Note: xxx small size < 100

The experience of the cohort aged 30-39 at the survey, which may be considered nearly complete, shows that the largest variations among the transition rates within each region are those produced by the movement from parity two to three (see Table 6.15). The largest regional differentials between Rio and São Paulo are in this transition rate. The differentials between Rio and the Northeast increased with parity. Table 6.16 shows that increases in trimeans paralleled reductions in the *quintum.* The comparison of the 20-29 and 30-39 age cohorts at the time of the survey shows an increase in the length of the second and third birth intervals in all areas. In the Northeast, a reduction in the fourth and fifth interval was observed. Similar conclusions are drawn when the two 20-29 cohorts are compared. In the Northeast, this comparison indicate a steady increase in trimeans among the youngest cohort except in the first birth interval The reduction in the length of the birth interval by the 20-29 birth cohort was also observed in São Paulo. These results suggest an increase in the importance of spacing among the youngest cohorts as part of the process of change in fertility.

Table 16
TRIMEAN VALUES BY AGE COHORT AND PARITY
Brazilian Regions 1986

Age Cohort	Rio de Janeiro	São Paulo	Northeast
Aged 20-29 at time of survey			
1	15.6	13.5	12.9
2	30.1	29.4	25.5
3	xxx	33.5	24.3
4	xxx	xxx	22.9
5	xxx	xxx	22.3
Aged 30-39 at time of survey			
1	14.7	15.6	12.8
2	28.0	26.8	23.1
3	33.7	29.0	23.5
4	23.3	30.3	23.7
5	xxx	27.9	23.4
Aged 20-29 ten years priori the survey			
1	14.7	15.5	13.7
2	27.5	26.2	21.9
3	27.9	27.7	22.7
4	xxx	xxx	22.7
5	xxx	xxx	21.6

Source: 1986 DHS
Note: xxx small size < 100

6.5- BIRTH INTERVALS ACCORDING TO SELECTED DEMOGRAPHIC VARIABLES

In this section, the attention is moved to certain demographic variables that are often considered to be related to fertility in a causal sense such as infant mortality and contraceptive prevalence. The analysis of the effect of infant mortality on birth intervals refers only to the Northeast as the infant mortality rate was almost twice as high there than in Rio or São Paulo at the time of the survey. It is expected that this high infant mortality could affect Northeastern fertility. Moreover, there are not enough sample numbers to study this relationship for Rio or São Paulo.

6.5.1 Infant Mortality

The classical view of demographic transition theory stresses the importance of a decline in infant mortality in bringing about a fall in fertility emphasising the replacement effect. As discussed in Chapter 1, research findings regarding the influence of mortality on fertility are not very conclusive. To measure the magnitude of the effect of infant mortality on family formation, life tables by birth order according to whether or not the previous child survived the first year of life are constructed for the Northeast. Figure 6.6 compares the *quintum* estimates controlled by the survival status of the previous child in their first year of life. Figure 6.7 shows estimates of the length of the birth interval, measured by the trimeans.

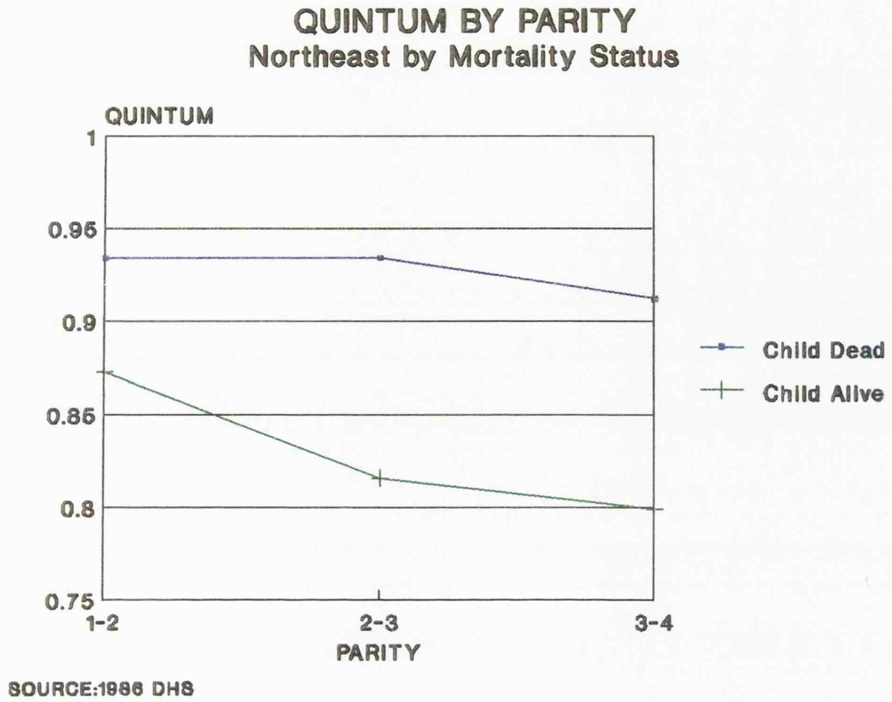

Figure 6.6

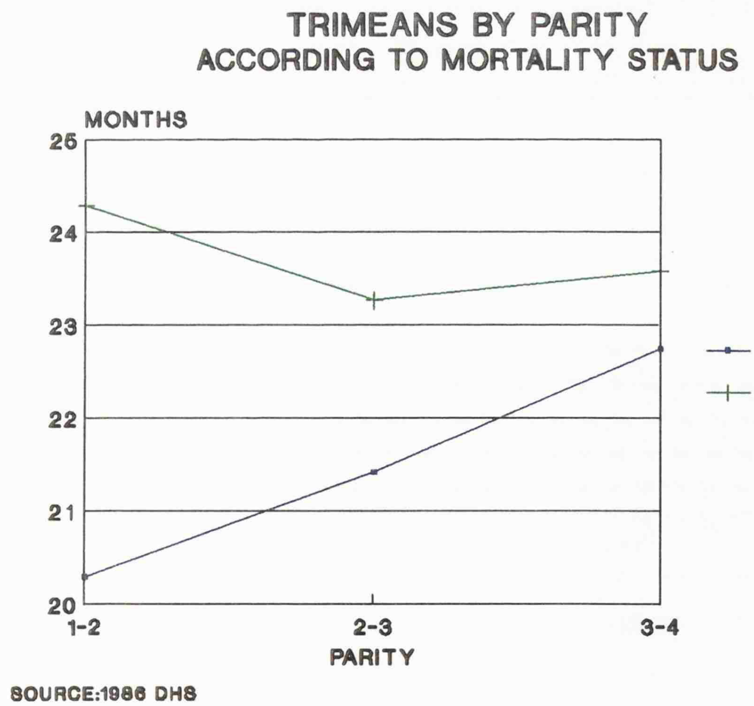

Figure 6.7

It may be seen that the death of the previous child increased the chance of a woman having a subsequent birth within five years and reduced the average birth interval. Although the differences are clear for all parities, the largest impact on fertility levels was on the *quintum* of the third parity. This increased from 0.823 to 0.942 with the death of the second child. The greatest impact on the length of the birth interval was found for the progression to the second birth; the interval was shortened by 3.3 months. Even considering only the impact of a single infant death on the next birth interval, these data suggest a positive relationship between the experience of child death and subsequent fertility in quantity and a negative one in timing. The cumulative effect on subsequent reproductive behaviour should be greater. For instance, the death of the first child increased the *quintum* of the third parity from 0.823 to 952 and reduced the trimean by two months.[309] The differences previously seen, although clear, are not enough to explain the regional differences in fertility behaviour. For instance, if only the *quintum* for the third birth of women with no previous child dead is considered, the regional differences would still be large, however reduced, as the Rio and São Paulo values were, 0.544 and 0.635, respectively.

6.5.2 Contraception Prevalence

As previously outlined, the relationship between fertility and contraceptives use may be specified in three different forms. One group consists of women who *plan* their families. They start to use contraception at an early stage of family formation, before the first birth, and are characterised by low fertility. The second group is comprised of those who *limit* or *control* their families. They start to use contraception after reaching the desired parity and this is assumed to be after the second birth. Another category is the group formed by women who have never used any contraceptives, the *no users*. In order to measure the impact of contraception on birth intervals, life tables by birth order are constructed for the three categories of women; *planners, controllers,* and *no users*. There is another category composed of women who started at parity one, which is assumed to be for spacing but these are not considered here. Small sample size only allows the estimation

[309] Data no shown.

of life table for the *planner* women and the residual in Rio de Janeiro and São Paulo. Thus, the *quintum* and trimeans of these two groups are compared in Table 6.17. For the Northeast, *quintum* values and trimeans are presented for the three categories in Table 6.18.

Table 6.17
***QUINTUM* AND TRIMEAN VALUES BY PARITY AND CONTRACEPTION STATUS**
Rio de Janeiro and São Paulo 1986

Parity	Rio de Janeiro		São Paulo	
	Planners	Other	*Planners*	Other
Quintum				
1	0.904	0.932	0.937	0.949
2	0.673	0.795	0.665	0.887
3	0.398	0.690	0.423	0.847
Trimean				
1	20.4	9.8	17.7	11.7
2	30.9	25.7	31.4	22.2
3	32.3	31.1	34.7	19.9

Source: 1986 DHS

Table 6.18
***QUINTUM* AND TRIMEANS VALUES BY PARITY**
Northeast 1986

Parity	*Quintum*	Trimean
Planners		
1	0.909	17.7
2	0.777	32.3
3	0.577	27.4
Controllers		
1	0.921	13.4
2	0.769	28.3
3	0.775	24.4
4	0.663	25.1
No Users		
1	0.944	11.7
2	0.895	22.6
3	0.888	21.6
4	0.900	22.0
5	0.858	23.0
6	0.920	25.0

Source: 1986 DHS

The impact of being a *planner* on *quintum* increases with parity in all regions. The strongest impact is observed in São Paulo where the *quintum* for the third parity of other women was twice higher than that observed among *planner* women. In the Northeast, among women who had never contracepted their probability of progression from the second to the third parity in five years was 88.8%. If she started to contracept after the second birth, their chance was reduced to 77.5% and if they did so before the first child this chance was reduced even more, to 57.7%. Early contraception also dramatically postponed the timing of birth. Variations in the trimeans were more marked in Rio in the first interval, in the third in São Paulo and in the second in the Northeast. Regional differences in *quantum* and *tempo* of fertility were much narrower among the *planners*

These results make clear the importance of parity at starting contraception on the subsequent fertility. It is also clear that women who started at an early stage of their reproductive life had very differential fertility compared to the other. There are some elements of circular logic in these results: the longer an interval is, the greater the chance a woman has of starting to use contraception. The higher the parity at which a woman starts, the less is the overall contraceptive effect. It is also evident that women who started to use contraceptives at lower parity are selective for a number of socio-economic characteristics, especially education.

6.6- BIRTH INTERVAL MEASURES ACCORDING TO SELECTED SOCIO-ECONOMIC VARIABLES

This section looks at the effects of socio-economic variables on the *quintum* of second and third parity and on the length of birth interval. Such analysis is very much affected by the reduced sample numbers when the disaggregation by socio-economic variables in carried out for Rio and São Paulo. Hence, it is not possible to take into account the same set of variables considered in the analysis of the onset of reproduction. The workable variables are women's education and work status. Even so, sample size does not allow the construction of life tables of orders higher than three for Rio and São Paulo. In addition, analysis by residence is presented for the Northeast, considering current residence and childhood place of residence. In all cases, the methodology comprises an analysis of life tables by birth order.

6.6.1-Women's Education

The analysis starts by comparing differences in birth interval for the same three educational groups used in the analysis of the first birth. They are: less than two years of school, two to four complete years and five and more years. Table 6.19 displays the *quintum* and trimean values for the second and third orders. These results show that belonging to a higher educational group reduced the probability of a woman going to the next parity in all regions. The most important impact is found in the transition from the first to the second birth in Rio de Janeiro and São Paulo and from the second to the third birth in the Northeast. For instance, among São Paulo women who had a first birth, the proportion who had another child within five years ranged from 0.801 for the second least educated women to 0.606 for those with five or more years of education. In Rio, for the same educational groups, the probability of progression to the second birth declined from 0.840 to 0.674. This clearly suggests changes in the family building process at an early stage of the reproductive life among highly educated women as the transition rate to the third birth was already low, especially in Rio de Janeiro. The control by education changed the pattern in the regional differentials for the *quintum* between the two areas. However, for the third parity Rio de Janeiro women experienced a lower transition rate for both educational groups considered.

Table 6.19
***QUINTUM* AND TRIMEANS MEASURES BY WOMEN'S EDUCATION AND PARITY**
Brazilian Regions 1986

Years	Rio de Janeiro	São Paulo	Northeast
< 2			
Quintum			
2nd	xxx	xxx	0.929
3rd	xxx	xxx	0.932
Trimean			
2nd	xxx	xxx	21.4
3rd	xxx	xxx	21.9
2-4			
Quintum			
2nd	0.840	0.801	0.874
3rd	0.543	0.667	0.884
Trimean			
2nd	26.2	26.1	23.7
3rd	27.2	28.1	23.0
5 and more			
Quintum			
2nd	0.674	0.606	0.820
3rd	0.515	0.548	0.649
Trimean			
2nd	29.9	29.8	28.1
3rd	31.9	28.9	26.9

Source: 1986 DHS
Note: Sample size < 100

Education was also very significant in bringing about a reduction in the proportion of women who progressed to the next parity in the Northeast (see Table 6.19). This was more marked in the transition from the second to the third birth. If a woman moved from the lowest to the highest education group, this proportion declined from 0.929 to 0.649. There were no differences between the transition rates for second and third parity among the lowest educated women. However, among the highly educated the *quintum* ranged from 0.820 to 0.649 for the second and third order, respectively, clearly indicating a parity control fertility regime.

As regards the *tempo* of fertility, the results indicate a rise in the length of the birth interval as the number of schooling years increases (see Table 6.19). The clearest effect is observed in Rio for the length of the third birth interval which was 4.7 months longer among the highly educated women compared to the medium educated ones. A marked impact of education is also observed in the Northeast and São Paulo which widened the length of the second birth interval. Education also reduced regional differentials in the length of birth intervals. These results suggest that fertility reduction started among highly educated women through a reduction in the *quantum* of births of parity higher than three. In areas where the reduction is more advanced it already reached the second parity as in Rio and São Paulo. Changes in *quantum* were followed by changes in the *tempo* of fertility which also suggests that fertility decline starts through family limitation and advances through birth spacing.

6.6.2-Women's Work Status

The analysis of birth intervals by women's working status includes the second, third and fourth parities. *Quintum* and trimean obtained from life tables of these birth orders are presented in Table 6.20. Workers had lower transition rates for all parities than non workers in all regions. The variation was regionally differentiated. In Rio de Janeiro, the largest variation was observed among women who progressed to the third birth. In São Paulo, this was more marked in the transition to the second child. In the Northeast, the changes were not so noticeable up to parity three. The largest decline was in the progression to the fourth birth. It may be also seen that variations in the trimean were not so consistent. In São Paulo, working women had shorter birth intervals than the non-working. This also occurred in Rio de Janeiro for the second birth interval. In the Northeast, the variations were not so clear except for the fourth birth interval. In this case, workers had a birth interval 2.4 months longer than non workers.

Table 6.20
***QUINTUM* AND TRIMEAN MEASURES BY WOMEN'S WORK STATUS AND PARITY**
Brazilian Regions 1986

Status	Rio de Janeiro	São Paulo	Northeast
No Working			
Quintum			
2nd	0.731	0.762	0.882
3rd	0.597	0.607	0.853
4rd	0.430	0.505	0.856
Trimean			
2nd	29.2	29.6	23.5
3rd	30.3	31.2	22.8
4rd	23.8	31.3	22.5
Working			
Quintum			
2nd	0.729	0.710	0.879
3rd	0.473	0.593	0.814
4rd	xxx	0.531	0.770
Trimean			
2nd	27.6	27.4	23.9
3rd	33.9	27.3	24.9
4rd	xxx	26.5	22.7

Source: 1986 DHS
Note: Sample size < 100

6.6.3- Women's Residence

The impact of residence on patterns of family formation was analyzed only for Northeastern women. As previously seen, sample size was too small to allow birth interval analysis disaggregated by residence for Rio de Janeiro or São Paulo. This is also true for current residence and childhood place of residence. The analysis here considers childhood place of residence. Figure 6.8 displays the *quintum* values and Figure 6.9 the trimean for women who grew up in cities and for those who grew up in towns or countryside.

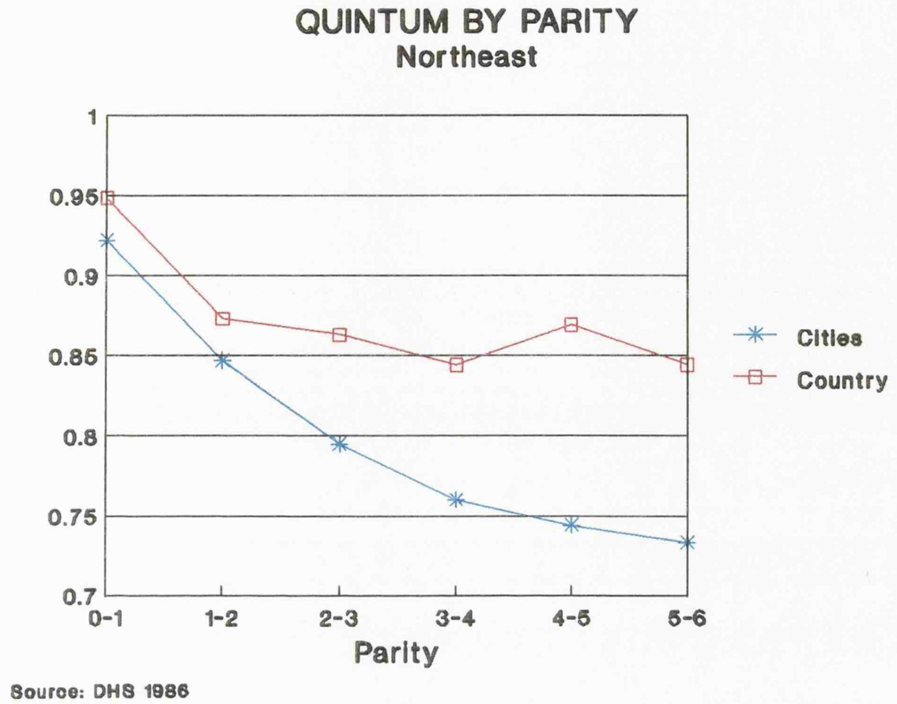

Figure 6.8

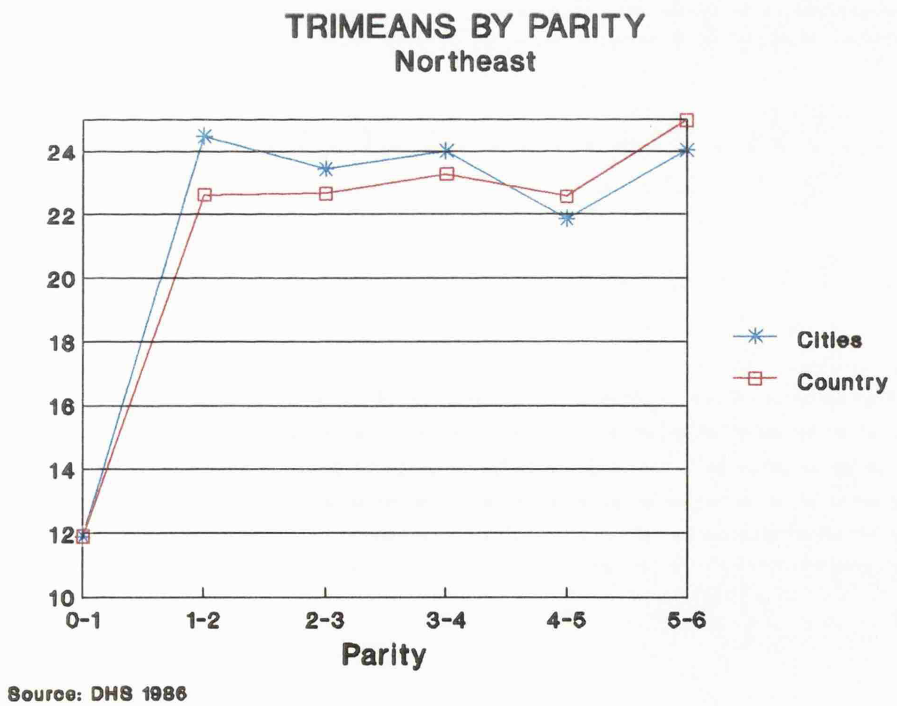

Figure 6.9

The effect of spending childhood in cities on the *quantum* of fertility is evident. This emerges at an early stage of the family life cycle, the second parity, and increases with parity. Although it is true for both comparisons, the differentials became more noticeable in the transition to the third birth, where the *quintum* ranged from 0.863 to 0.795 between women who grew up in rural areas or towns and those who grew up in cities. The differentials continued to increase with parity, so for the transition from the fifth to the sixth birth, the proportion of women who progressed within 60 months declined from 0.844 to 0.733. The trimeans were not markedly affected ; this was longer in the second birth interval. among women who grew up in cities.

6.7-THE STOPPING OF REPRODUCTION

The analysis of stopping patterns requires the identification of women who will bear no more children and is often restricted to those women who have completed reproduction. In practice this means looking at older women whose reproductive career started about 30 years ago and was conditioned by circumstances different to those of younger women. Furthermore, the restrictions of the DHS surveys to women in the reproductive period means if the oldest cohort is taken, women aged 40-44, that there is no guarantee that all these women had stopped childbearing. The only variable that definitely means the end of the reproductive period is sterilization, which has grown in importance in all three areas. For the other variables, the level of uncertainty can be very high. Divorce or widowhood, for example, do not ensure the stopping of sexual intercourse. Other variables, such as terminal sexual abstinence or menopause, depend heavily on the woman's own perception of whether she has reached the point of no return. There is, therefore, no clear-cut distinction between spacing and stopping. Nevertheless, an attempt is made here to construct some estimates of stopping based on age at last birth and age at sterilization.

Age at most recent live birth was recorded for all women. For most women aged 40 and over their most recent birth will in fact be their last birth. The median age at last live birth for the three areas are displayed in Table 6.21. As expected, the Northeast had the highest median values, 5.2 years higher than the Rio de Janeiro median, the lowest value. Median ages at sterilization are also given in Table 6.21. The adoption of sterilization as a stopping behaviour implies a dramatic reduction in the regional differences in the stopping pattern, its virtual elimination in fact. Due to the small sample size, it is not possible to calculate median ages disaggregated by any socio-economic variables either for last live birth or for sterilization.

Table 6.21
MEDIAN AGE AT LAST LIVE BIRTH AND AT STERILIZATION
Brazilian Regions 1986

Median Age	Rio de Janeiro	São Paulo	Northeast
Last Birth	31.3	33.3	36.5
Sterilization	30.2	30.1	30.5

Source: 1986 DHS

Figure 6.10 compares the median ages at first and last birth for women aged 40-44 at the time of the survey. It clearly shows the longer exposure period experienced by Northeastern women. This might explain part of the regional fertility differences. According to these indicators, the length of the reproductive period was 9.7 years in Rio de Janeiro, 11.8 in São Paulo and 15.5 in the Northeast. Figure 6.11 compares the median age at sterilization with the median age at first birth of the sterilised women. In this case, all women experienced a dramatic reduction in the span of their reproductive period. The impact was larger in the Northeast. The regional difference between the Rio de Janeiro and São Paulo

was completely eliminated and that related to the Northeast was reduced to one year. This suggests that sterilization may contribute to a reduction on the regional differentials on fertility.

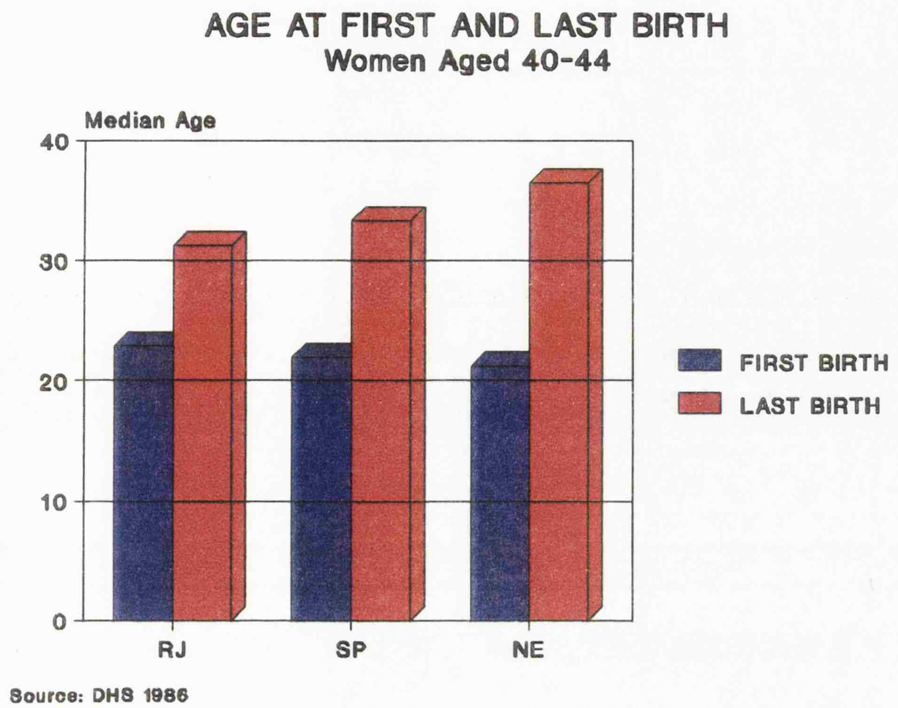

Figure 6.10

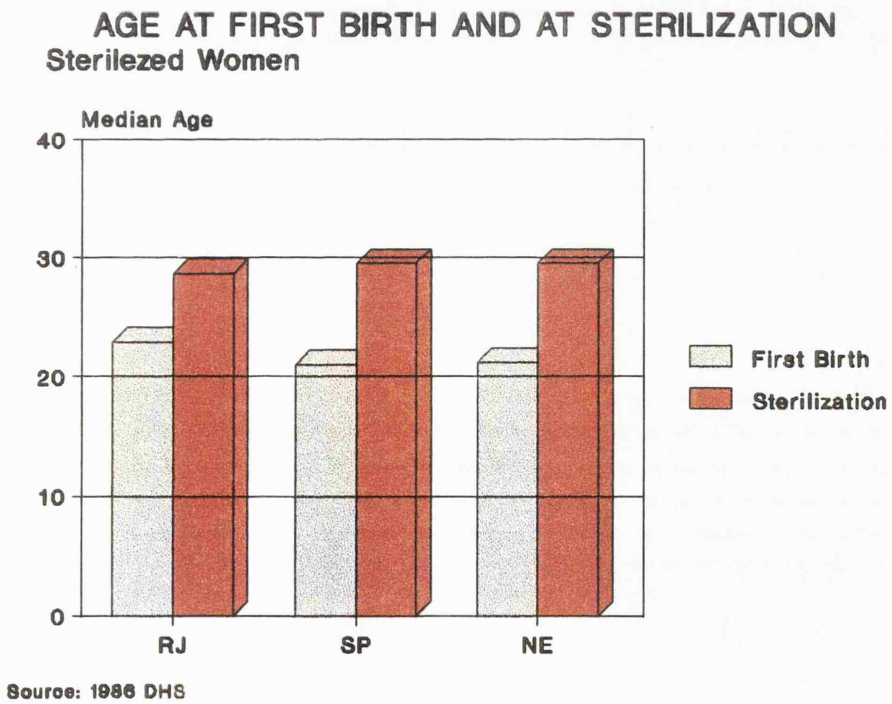

Figure 6.11

Finally, Table 6.22 compares median age at first birth for women who finished their reproductive life. In all regions, sterilised women started earlier than the other. This difference was larger in the Northeast, 1.4 years and shorter in São Paulo, one year. This suggests that sterilization was used for controlling fertility but without much change in the other strategies of the reproductive process as the onset, for instance.

Table 6.22
MEDIAN AGE AT FIRST BIRTH FOR WOMEN WHO FINISHED REPRODUCTIVE LIFE
Brazilian Regions 1986

Median Age	Rio de Janeiro	São Paulo	Northeast
Last Birth	23.3	22.1	22.1
Sterilization	22.2	21.7	20.7

Source: 1986 DHS

6.8-SUMMARY

The detailed analysis of the patterns of fertility transition in the three areas by means of the behaviour of families throughout all the reproductive phases of their lives, allows the identification of a wide range of fertility transition experiences. The differences arose at the onset of reproductive life, for the spacing of births and the stopping. All these stages of life showed changes which modified the family cycle at a different pace in each region. However, motherhood was virtually universal in the three areas in despite of regional and socio-economic differences in the pattern of the first birth.

Rio de Janeiro women started reproductive life later than São Paulo as measured by age at first birth. On the other hand, São Paulo women began later than the Northeastern. The trend observed for the whole period was a postponement of the age at which women started childbearing in all regions. Nevertheless, the indicators for the more recent period point towards an earlier onset of reproduction in São Paulo and the Northeast. These changes were caused by an increase in pre-marital births and conceptions to teenaged women which also resulted in a shorter first birth interval. This also occurred in Rio de Janeiro. The chance of a woman becoming a mother within five years of marriage increased in the period, especially in Rio de Janeiro.

The spacing analysis pointed to a decline in the probability of closing an interval from parity two until parity four in all regions but with some differences. The largest decline was in Rio, particularly in the proportion of women who progressed to the third child. São Paulo women behaved in a similar way as Rio women but their transition rates were higher. The probabilities suggest that family limitation might have started at parity two and that parity exerted an influence on the reproductive process there. Changes in the Northeast were much less noticeable. Regional differences increased with parity. The most significant difference between Rio and São Paulo was in the progression from the second to third birth. Between the Northeast and the two other regions, the most important contrast was found in the transition to the fourth parity. The speed at which births of any order occur was faster in the Northeast than in Rio de Janeiro or São Paulo. Apart from the first birth, it seems that childbearing was concentrated between 2 and 2.5 years after the start of the interval in Rio and São Paulo and at approximately two years in the Northeast. In general, all regions showed an increase in birth intervals as parity increased.

The time-period analysis confirmed that demographic transition started earlier in Rio de Janeiro and reached a more advanced stage there. Transition rates for parities higher than one declined in all regions. The largest decline occurred in the transition to the third birth. The downfall brought about a reduction of the regional differentials for the progression to the second birth. Interestingly, women in all regions were having less children of high parities in Rio and the Northeast and more women were becoming mothers there. Although the timing measures were somewhat affected, changes in *quintum* were more marked than changes in timing, suggesting limitation of births rather than their spacing as an strategy of fertility decline. Cohort analysis confirms the main patterns of the fertility decline pointed to by the time-period analysis. However, it indicated more marked changes in timing than those seen in the time period analysis. Apart from the Northeast, increases in trimeans followed the declines in *quintum*. This suggests a change in fertility caused by spacing as well as stopping, probably associated with an advanced stage of the fertility decline in Rio and São Paulo.

The study of the interrelationship between fertility changes and the intermediate and socio-economic variables permits a few reflections also. The intensity of the relationship was regionally differentiated but the direction of the regional differentials on the *quantum* and *tempo* of fertility was not altered after these variables were controlled. The first variable analyzed was age at starting the interval and the variations on *quintum* either by age at marriage or by age at motherhood confirm the association described in the literature between early marriage or motherhood, higher fertility and shorter birth intervals. Although this was observed in all regions, the intensity of this effect was regionally differentiated. This effect was much more important in areas where fertility decline was more advanced, Rio de Janeiro. Moreover this does not explain the regional differences in *quintum* or trimean.

Timing of first use of contraception seemed to be very important in determining family size. *Quintum* and trimean were strongly affected by parity at first use of contraceptives. The estimates suggest that for women who contracepted before the first birth, *planners*, changes in timing started at an earlier phase of the family life cycle. For instance, they had fewer pre-marital births and conceptions and longer first birth intervals. Changes in the *quantum* of fertility increased with parity and were very marked in the progression to the third birth. In the Northeast, the transition from no-use to use for *planning* dramatically reduced the regional differences in the *quantum* and tempo of fertility. Nevertheless, some regional differences still remain. These results make clear the importance of parity at starting contraception on the subsequent fertility but suggests that there are some regional components to reproductive behaviour that cannot be explained by contraceptive strategies.

Education influenced family patterns in all stages; highly educated women had their first birth later, lower pre-marital fertility, longer birth intervals and lower *quintums* than lowly educated women. This was true in all regions but the intensity of the effect was also regionally different. Education resulted in lower motherhood probabilities in Rio and the Northeast. It also provoked changes at early stages of the family formation process, the second birth, in Rio de Janeiro and São Paulo. With the increase in education, a marked reduction was observed in the transition from the first to second birth there. In São Paulo, this over-compensated for the regional differences. In the Northeast, an increase in education brought about a large reduction in the *quintum* of third order. This contributed to a reduction in the regional differentials at this parity. As regards the *tempo* of fertility, the results point to a rise in the length of birth intervals as the number of years of schooling increases. This effect was clearer on the third interval in Rio and the Northeast and on the second in São Paulo. Among all variables analyzed this was the most important as regards the intensity of the observed effect.

The analysis of birth intervals by women's working status shows that workers had lower transition rates for all parities than non workers in all regions. This effect was also regionally differentiated. In Rio de Janeiro, the largest impact was observed among women who progressed to the third birth. In São Paulo, this was more marked in the transition to the second child. In the Northeast, changes were not so noticeable up to parity three. The largest effect was in the progression to the fourth birth. The effect on the *tempo* of fertility produced by women's work status was not so steady.

For the Northeast, the impact of more variables could be studied. For instance, the mortality of the previous child in the first year of life was considered important in the *quantum* and timing of fertility, especially the latter. The impact on *quintum* was more marked in the third parity but it was the length of the second birth interval which was more affected. The effect of residence was also analyzed through childhood place of residence. This showed some effect on the onset and spacing phases of family formation. Women who grew up in cities had lower transition rates compared to those who grew up in rural areas or towns. The lower fertility of city women was more noticed in the progression to the third birth. The average birth interval did not show significant differences.

Rio de Janeiro women experienced the earliest stopping of reproduction. The latest stopping pattern was found in the Northeast, 5.2 years later than Rio if age at last birth is taken as age at stopping. As a result of their earlier start and later stopping, Northeastern women spent more time in reproductive life. Since they also experienced shorter spacing patterns, their fertility was inevitably much higher. However, sterilization provoked a shortening of the reproductive span, especially in the Northeast, which also resulted in a reduction of the regional differences in stopping. However, sterilised women started earlier than other women.

Chapter 7

PREFERENCES AND ATTITUDES TOWARDS FAMILY SIZE: The Role of Certain Institutions

7.1-INTRODUCTION

The Coale's first condition defines fertility transition as a shift in the mechanisms of reproductive process control from institutional arrangements, society's marriage system, family organization, property systems, to individual choice, *couple's conscious choice*. This means the awareness of a desired family size. Van de Walle suggested that without the perception of a *numeracy* about children, the perception of a particular family size as a goal in a long term strategy of couples, it is unlikely that *conscious choice* exists.[310]

An unclear point is to what degree the new behaviour reflects *couples' conscious choice* or is a result of institutional pressure. *Conscious choice* should reflect genuine preference. There are some indications in developing countries, for instance the narrowing of the range of preferable or observed family size, that social pressure may come before conscious choice. Social pressure through institutions may affect people's ideas about desired family size. They spread new values which in some way reflects the necessity of a specific social group. They offer services such as health, for instance, which may also act as an element of moulding behaviour.

The objective of this chapter is to investigate the existence of preferences about family size and the extent to which reproductive behaviour is an outcome of these preferences in the three studied areas. It also seeks to find some factors which shape these preferences and women's behaviour towards their achievement. The chapter is entirely based on the 1986 DHS survey data and all the analysis refers to ever married women. Infecund women are excluded.

[310] See: van de Walle (1992), p 490.

The first hypothesis considered in this chapter is that preferences for a certain number of children is partially affected by social pressure, here measured by some institutions. These institutions are: mass media, health services and the Church. The chapter incorporates an evaluation of the their role in the dissemination and legitimization of the value of a small family and of the means to implement women's preference. Another hypothesis is the belief that one effective way to achieve the desired family size is by behaving (i.e. contracepting) towards this since the start of family formation. Hence, parity at starting contraception is one of the most important proximate determinants considered here.

Although the Brazilian Government has never had an effective family planning policy, it was pointed out by Faria (1988) that many economic decisions in the economic and social domain may have had the effect of implicit population policies producing some unanticipated and unintended effects on fertility decline. He analyzed the impact of three such policy areas on contraception use in Brazil: the expansion of the coverage of social security, mass communication and health services. Apart from this work, only two other empirical studies are known about the impact of key social actors on reproductive behaviour. Both of them examine the impact of television exposure and are related to the Northeast.[311] The implementation of the policies mentioned by Faria, especially the expansion of health services, has been regionally differentiated producing differentiated impacts. Thus, the second hypothesis investigated here is that this differential expansion plays some role in the regional fertility differentials either through the desired or the observed fertility.

This chapter is composed of nine sections, including this introduction. Section 7.2 presents a brief description of the evolution of the three social actor's ideas and attitudes about family size and family planning and these are analyzed in turn. Section 7.3 examines women's preference about desired family size. As the progression (or not) to the third birth seems to be a watershed between the new and old patterns of family formation, section 7.4 offers an analysis of women with two living children with respect to their attitude to progressing to the third birth. It also includes an analysis of the planning status of the last birth to women with three children. Measures of unwanted fertility are given in

[311] See: Faria and Potter (1994) and Wong (1994).

section 7.5. Section 7.6 examines women's attitudes towards their fertility preferences. Section 7.7 is an attempt at measuring the impact of the social actors previously mentioned on contraceptive practice. In addition, section 7.8 investigates the impact of parity at starting contraception on the amount of unwanted fertility and also evaluates the influence of the key social actors on women's chances of beginning contraception at an earlier stage of their reproductive life. Section 7.9 summarizes the results.

7.2-IDEAS OF THE THREE SOCIAL ACTORS ABOUT FAMILY SIZE AND FAMILY PLANNING

This section describes the postures and strategies of health services, mass communication and the Catholic Church in Brazil that could have affected reproductive behaviour. It is very much influenced by the works of Barroso (1988 and 1991) and Martine (1995). Their work stressed that the main impact of health services and mass communication expansion on fertility change may have been unanticipated and unintended. Moreover, it seems that the fertility decline itself has played a significant role in the modification of some point of views, for instance, those that guided health services and the Catholic Church.[312]

7.2.1 The Health Services

The health policies implemented in Brazil during the 1960s and 1970s promoted the medicalization of society. Their emphasis was on the expansion of remedial/hospital medicine over preventive medicine, the promotion of private (though subsidised) medicine and the marked expansion in the coverage of the health system by joining the social security system to the health system. As seen in Chapter 2, the number of persons covered by such services increased substantially as did the number of medical and paramedical personnel. Nevertheless, this expansion has been regionally differentiated benefiting São Paulo and Rio de Janeiro much more than the Northeast.

As discussed in Chapter 1, the main expected contribution of health medicalization to fertility control is through the legitimatization of the use of medical birth control techniques, reducing the psychological costs of fertility regulation. Moreover, it is

[312] See Martine (1995), p 10.

likely that greater health exposure might increase the costs of bringing up children by defining new parameters for child care and stressing the quality versus the quantity of children. This also would lead to more fertility control.

7.2.2 Mass Communications

The importance of the spread of mass communication, especially television, in fertility regulation is also noted as another unintended and unanticipated consequence of Government policies on Brazilian fertility decline.[313] Since the early 1960s the Brazilian State has massively invested in a modern telecommunications structure. As a result, radio and TV communications have connected the entire country. At the beginning of the 1960s, only 30% of all households had a radio, while television reached only a few households in the main cities. In 1991, 76% of all households in the country had a radio and 78% of urban households had a TV.[314] It is assumed in this thesis that mass media plays an important value in diffusing the value of a small family. Hence, of greater importance than the expansion in the number of households with radio and television seems to be the changes that took place in the messages conveyed by these vehicles.

There is no evidence that the mass media in Brazil has conveyed any explicit or implicit messages actually aimed at promoting changes in reproductive behaviour. As discussed in Chapter 1, an important Brazilian television genre is the *telenovela* (soap opera) which attracts about 80% of the audience. In the early 1960s, the most famous *telenovela* was called "The Right To Be Born" and it gave a very clear message against abortion, even in the case of illegitimate fertility. It also stressed the importance of motherhood as a women's role in society. Faria and Potter analyzed the content of the messages about fertility behaviour conveyed by the recent *telenovelas*. They disseminate a particular family image: small, unstable and consumer-oriented. Moreover, they also stress the advantages for women of separating sexuality from reproduction, of remaining single, of working outside the home. They also promote the cult of corporal beauty, etc.[315]

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313 See Faria (1988), p 10 and Faria and Potter (1994) pp 28-9.

314 See Martine (1995), p 27.

315 See Faria and Potter (1994), pp 28-9.

The mass media has also been a very important vehicle in the promotion of consumption as a way of life.

7.2.3 The Catholic Church

Traditionally, the Catholic Church opposed intercourse without procreation. Only in the early 1960s were periodic abstinence and responsible parenthood allowed, as expressed in the *Populorum Progressio* and *Humanae Vitae* encyclicals. The Brazilian Church adopted the same principles. This means a pro-natalist attitude and a rejection of the idea that population control would alleviate poverty and lead to economic development. From the couples' point of view, responsible parenthood should guide their reproductive decisions. Natural methods were accepted and other methods opposed.

However, the Brazilian Church has not always presented a united front on family planning matters. The more conservative segments and most of the upper levels in the hierarchy have persisted in the proclamation of traditional doctrines. Meanwhile, the more progressive sectors have promoted grass roots political movements and allied themselves to liberal and leftist groups as well as to women's movements. The argument of the progressive sector was against both foreign and government intervention in the private domain. At the same time, the lower clergy has been permissive, discreetly advising the faithful to adopt natural and other regulatory practices.

When it became evident that fertility was declining dramatically among all sectors of the population, the Catholic Church began to accept birth control. This was first conditioned only on the use of natural methods. Lack of support among the faithful for this position and an awareness of the widespread use of non-natural contraceptive methods have changed this position. Nevertheless, a common point of view is still lacking among the several sectors of the Catholic Church. Now it seems that only on abortion does the Church present a united point of view. All sectors are against this practice.

7.3-REPRODUCTIVE PREFERENCES

Fertility studies in Brazil have focused more on fertility outcomes, i.e. fertility rates, than on fertility motivations. Questions on reproductive motivation have been posed in CPS and DHS surveys. Prior to these, only two surveys are known that collected information about desired mean family size in the three study areas.[316] They were undertaken in Rio de Janeiro city during the 1960s.

7.3.1 Reproductive Preferences: time trends

The first known Brazilian survey which gathered information about reproductive preferences was undertaken in 1960. Men living in Rio de Janeiro and in small villages in the area answered questions about desired family size. The desired mean size reported was 2.6 and the highest frequency of the distribution, the mode, was 2.0. The mean ranged from 3.3 among non-skilled workers living in villages to 2.1 among the highest skilled workers living in Rio city. Residence played a more important role in aspirations about family size than did type of occupation.[317]

The other survey was carried out in 1963 in Rio de Janeiro city. About 62% of the sample women reported having already thought about their desired number of children. This percentage ranged from 77.3% among those of the highest economic status to 51.5% among the lowest. About 14% of the surveyed women did not expect to control their reproduction at all. Financial conditions were the main reason for 46.1% of them accepting birth control. This was true among women of all economic strata except the highest. This group reported health problems as the main reason for accepting birth control.[318] When these women were asked about the number of additional children they desired, only 2.1% answered "those that come". About 78% wanted to stop childbearing before the end of reproductive life.[319]

Information about family size preference collected by the Contraceptive Prevalence Surveys (CPS) refer to the planning status of the most recent pregnancy and to whether a woman wants an additional birth. Faria and Potter, using these and the 1991 DHS data, estimated total desired fertility for the Northeast for 1970-80 and 1990-91.

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[316] Another survey that collected information about the planning status of pregnancies is known. This is not mentioned in the main text as it refers to Rio Grande do Sul. See Etges (1985).

[317] See Kahl (1966), pp 24-5.

[318] See: Iutaka (1965), pp 105-8.

[319] See Hutchinson (1964), p 29.

They found a decline in this indicator from 2.2 to 1.8, while the TFR fell from 5.4 to 4.2 at the same time. They suggested that the fertility decline observed in the period was more a result of attitudes towards fertility control than a change in preferences.[320]

The planning status of the last child, obtained from the CPS, is analyzed in Table 7.1. It displays the percentages of women who did not want the last born child controlled by parity for the Northeast and São Paulo. The Northeast's figures refer to a weighted average of four of the five states where the CPS was undertaken; Bahia, Pernambuco, Piauí and Rio Grande do Norte. They indicate an increase in unwanted births as parity increased. About 41.1% of births at parity five were unwanted. Figures for São Paulo point in the same direction but unwanted births increased at a faster speed than in the Northeast. For women with four live births, over one third of the last pregnancy was unwanted and 58.5% of last pregnancy to women with parity five was unwanted. An estimate of the wanted cohort fertility rate (WCFR) for the synthetic cohort is also given in Table 7.1. The values obtained, 2.8 and 3.7 for São Paulo and the Northeast, respectively, indicate a clear regional differential in these preferences.

Table 7.1
PERCENTAGE OF WOMEN WHO DID NOT WANT THE LAST BORN CHILD BY PARITY
Northeast and São Paulo

Parity	Northeast[1]	São Paulo[2]
1	2.3	3.5
2	6.2	9.2
3	13.2	22.5
4	22.2	38.9
5	41.0	57.5
WCFR	3.7	2.8
N	3,719	1,736

Source: [1] Rodrigues et al (1980), p 47
Rodrigues and Schiavo (1980), p 60
Arruda et al (1980), p 58
Rodrigues and Almeida, (1980) p 57
[2] Nakamura and Fonseca (1979), p 67

7.3.2 Desired Fertility in the 1986 DHS

[320] See Faria and Potter, p 25.

An attempt at measuring women's intentions about family size is carried on here using information gathered by the 1986 DHS: preferred family size, whether the last child born in the last five years was wanted and desire for another child. The two first questions may present problems of *a posteori* rationalization. It is said that respondents try to report desired family size equal with the actual and that women are likely to underreport the occurrence of unwanted births. In this case, the mentioned rationalization would underestimate the gap between desired and actual fertility. Nevertheless, as will be seen, the comparison between actual and desired fertility always shows a difference denoting some amount of unwanted fertility. This is regionally differentiated in the expected direction. Northeastern women always exhibit the highest amount of unwanted fertility. It is assumed here that the comparison of data originating from the three questions previously mentioned allows some assessment of consistency in the information.

Figure 7.1 shows the percentage of ever married women who reported a preference for a certain number of children in the three regions. Very few women reported an unknown preference. The maximum percentage of women who did so is found among Northeastern women, 1.4%. The preference for families of two children is clear in all regions. Although, this is the highest frequency of the distribution, the mode, the percentage of women who reported wanting a family with two children ranged from 46.5% in Rio to 36.5% in the Northeast. The difference in this percentage between São Paulo and Northeast women is not very large (6.0%).

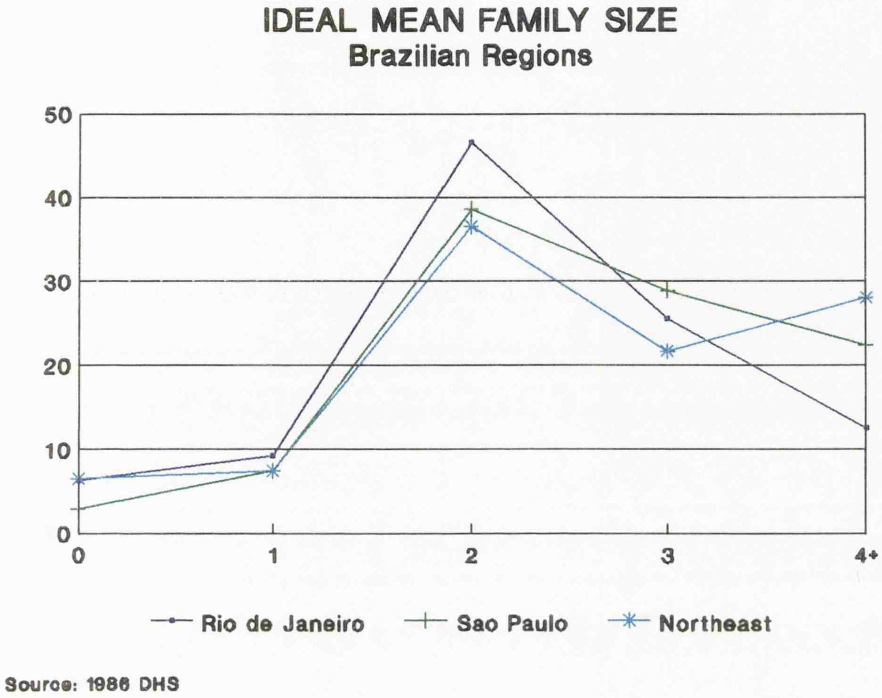

Figure 7.1

More marked regional differences are found in the preference for three and four children (see Figure 7.1). More women in São Paulo desired three children (28.8%) than in Rio (25.5%) and the Northeast (21.6%). More Northeastern women desired four children (28.0%) compared to São Paulo and Rio women, 22.4% and 12.5%, respectively. The largest percentage of women who wanted to be childless is found in the Northeast (6.5%). Rio women exhibited the highest percentage of women who wanted only one child, 9.2%. The desired mean family size ranged from 2.4 in Rio de Janeiro to 2.8 in the Northeast and São Paulo.

It is assumed that family size preferences are affected by demographic variables (women's age, parity, age at marriage) and socio-economic variables (education, work' status, etc,). It is also assumed that the three social actors, health services, mass media and the Catholic Church, also play some role in shaping this preference. Table 7.2 displays desired means family size by parity. Parity in all this chapter is measured by the number of living children, assuming that reproductive decisions take into account living children rather than children borne. The reported mean family size preference is positively associated with parity. This occurs after parity one in all regions. It is likely that this reflects age effects (younger cohorts prefer a smaller family) and previous fertility (some unwanted births reported as desired). The range of variation in the desired mean family size by parity was 1.1 children in Rio, 0.8 in São Paulo and 0.6 in the Northeast. In all regions, women with one child reported the smallest desired mean family size, 2.1 in Rio and 2.4 in the two other regions. In Rio, women reported preference for slightly smaller families than in the other regions. This was true for all parities except for parity four or more which might reflect fluctuations caused by small sample numbers. At this parity, Northeast women reported the smallest number of desired children.

Table 7.2
DESIRED MEANS FAMILY SIZE BY PARITY
Brazilian Regions

Parity	Rio de Janeiro	São Paulo	Northeast
0	2.2	2.6	2.7
1	2.1	2.4	2.4
2	2.2	2.6	2.7
3	2.8	3.1	3.0
4+	3.2	3.2	3.0
N	484	469	1,091

Source: 1986 DHS

The effect of a number of socio-economic variables on family size preference is evaluated in Table 7.3. Eight variables are considered. The first two aim at investigating women's socio-economic status through their education and current work status. Women are grouped according to the number of complete schooling years: less than two years; two to four years and five and more years. Women are also classified as currently working or not. The next variable measures the effect of childhood place of residence on fertility preferences. Women are categorised according to the place where they spent their first 12 years: the city or the countryside. Those who spent childhood in towns are included in the countryside group. The fourth variable is a four category classification of women's husbands' current occupation. It ranges from white collar workers (professional, administrative and managerial groups) to agricultural workers. The manual (skilled and non-skilled) workers and the sales and services groups fall somewhere in between these two.

Another variable is exposure to mass communication. Three degrees of exposure are defined. Women who watch television and read a newspaper at least once a week are considered to be highly exposed. By medium exposure is understood women who either watched television or read a newspaper at least once a week. The group of women who answered no to both questions are classified as having low exposure. Women's contact with health services (the sixth variable) is also measured according to three degrees of contacts for women who had at least one child. High contact refers to women who had both pre-natal care and a tetanus vaccination during the last pregnancy. Medium refers to that group of women who received only one of the two items of health care mentioned and low means they did not have either.

The role of the Church is considered. Two variables are taken into account: attendance to services and the opinion of the religious leader about family planning. Attendance at religious services is divided into three groups: a high level if women go to church at least once a month; a low level if they go to church but not regularity; and a zero level if they do not go to church. In addition, the opinion of the religious leader about family planning is also considered. By religious leader with no opinion is considered those who reported not having any opinion. This excludes those who did not answer the question. Finally, age at marriage is also considered on order to measure the effect of exposure time to risk of childbearing. Two marriage cohorts are defined according to the median age at marriage. This was around 20 years in Rio de Janeiro and São Paulo and 19 years in the Northeast.

Table 7.3
DESIRED MEAN FAMILY SIZE BY SOCIO-ECONOMIC VARIABLES
Brazilian Regions

Variables	Rio de Janeiro	São Paulo	Northeast
Schooling Years			
<2	2.6	3.1	2.9
2-4	2.4	2.7	2.8
5 and More	2.2	2.5	2.5
Currently Working Status			
No	2.4	2.8	2.8
Yes	2.4	2.7	2.9
Childhood Place of Residence			
Town/Country	2.6	2.7	2.8
City	2.4	3.0	2.9
Husband 's Occupation			
Agricultural	xxx	3.0	2.9
Skill-unsk	2.3	2.8	2.7
Sales & Serv	2.5	2.6	2.7
Prof & Clerk	2.3	2.7	2.9
Mass Communications Exposure			
Low	2.6	3.1	2.9
Medium	2.4	2.7	2.8
High	2.4	2.7	2.8
Health Services Contact			
Low	2.5	2.9	2.8
Medium	2.3	2.6	2.8
High	2.5	2.7	2.8
Frequency of Attendance at Religious Services			
No	2.2	2.7	2.7
Low	2.3	2.7	2.8
High	2.6	2.9	2.9
Religious Leader's Opinion about Family Planning			
Against	2.7	3.1	3.1
Favourable	2.4	2.7	2.9
No Opinion	2.6	2.8	2.8
Age at First Marriage			
<Median	2.5	2.9	3.0
>Median	2.3	2.8	2.7
N[1]	502	457	901

Source: 1986 DHS
Note: [1]The N values for health are lower as only women with at least one child are taken. They are 438 for Rio and São Paulo and 1,054 for the Northeast
xxx =Sample size < 30

None of the variables considered seems to play an important role in women's preference for children. Education followed by the opinion of the religious leader head the list of the variables which had the largest impact on family size preferences in all regions. Highly educated women in São Paulo reported a desired family 0.6 children smaller than the least educated. The comparable range of variation was 0.4 in Rio and the Northeast. The opinion of the religious leader was also more important in São Paulo. Women whose religious leader was against family planning desired a family with 0.4 children more than those whose religious leader was favourable to control. This difference was slightly smaller in the two other regions, about 0.3 children. Apart from these two variables, others relatively important were women's exposure to mass communications, childhood place of residence and in São Paulo, health exposure. The impact of health services is observed when women who had no contact and those who had medium contact are compared. Attendance at church and the husband's occupation are relatively important in Rio de Janeiro. Age at marriage played some effect in the Northeast. Women who married early reported a preference for a sligtly larger family (3.0) than those who married later. Overall, however, the differences were surprisingly slight for all variables.

These results make it clear that the desired mean family size was not very much affected by the variables considered and the regional differences were not very marked. The most important impact is that produced by parity which might suggest a somewhat adjusted preference to the actual fertility outcome. It may be expected that the question about desired mean family size makes more sense among women who really *plan* their families, or at least, among those who have not yet reached the desired mean family size.

Another attempt at measuring family preference is displayed in Table 7.4, through the percentage of women who reported wanting the last child born by parity. The answer to this question seem also affected by a posteriori rationalization; women are likely to underreport the occurrence of an unwanted birth. Nevertheless, even probably underestimated, these percentages point in the expected direction. They declined with parity and are higher in the Northeast, except for the two first parities. The percentage of women in Rio and São Paulo with three living children who reported having desired their last birth is much lower than those for women with two living children. In the Northeast, the largest difference is found between women with three and those with four children. The lowest percentage of women who wanted the first child was found in the Northeast.

Table 7.4
PERCENTAGE OF WOMEN WHO WANTED THE LAST CHILD BORN BY PARITY
Brazilian Regions

Parity	Rio de Janeiro	São Paulo	Northeast
1	85.7	88.9	80.6
2	72.6	82.1	74.7
3	47.2	65.0	66.1
4	xxx	48.4	56.3
WCFR	1.9	2.3	2.0
N	227	264	785

Source: 1986 DHS
Note: xxx Sample size < than 30

Table 7.4 also presents the wanted mean family size of those synthetic cohorts, WCFR. It varies from 1.9 for Rio women to 2.3 for São Paulo. These figures are much lower than the reported desired mean family size. This might be caused by the fact that while the reported desired mean family size reflect preferences for a family as a whole, the planning status of the last birth is more affected by timing circumstances. The comparable rates for 1980, presented in Table 7.1, indicate a reduction on desired fertility of 0.5 children in São Paulo and the Northeast.

A more plausible way to analyze desired family size preferences seems to be through the question of whether women wanted an additional child or not. As the previous indicator, this is not a purely family size preference measure as it indicates an adjustment of fertility preferences to fertility outcomes. In order to prevent the bias caused by women who declare a desire for no more children but were in fact wishing to postpone births rather than stop childbearing, DHS surveys included four response possibilities before that which expressed no desire. These are whether women want a birth within two years; or after two years; if they want another child but are unsure about timing; or if they were undecided about it. This question is regarded as the least biased of the standard preference measures.[321]

[321] See: Bongaarts (1990), p 132.

Table 7.5 presents the percentage of women who want another child by the number of living children. The four first possibilities of answer mentioned above are taken as a positive desire for another child. Pregnant women are excluded from the analysis. A noteworthy percentage of women did not want to start motherhood, especially in the Northeast, where this was so for 24% of childless women. This is consistent with the percentage of women who reported not having desired the first child, 19.4% (see Table 7.4). After starting childbearing, more Northeastern women wanted to progress to the next parity than in the other two regions, especially compared with Rio. For instance, 67.5% of women who had one living child reported desiring the next one in the Northeast and 66.6% in São Paulo; the comparable percentage is 51.0% among Rio women. In all regions, a large difference between the proportion of women with one child who wanted the second birth and those with two living children who wanted to progress to the third birth is observed. This gap is largest in Rio de Janeiro. At parity two, the regional differences in preferences to continue childbearing are much larger, mainly between Rio and the two other areas. The difference between São Paulo and the Northeast is largest at parity three.

Table 7.5
PERCENTAGE OF WOMEN WHO DESIRE ANOTHER CHILD BY PARITY
Brazilian Regions

Parity	Rio de Janeiro	São Paulo	Northeast
0	85.4	90.6	75.9
1	51.0	66.7	67.5
2	13.1	27.4	31.3
3	8.0	4.9	20.1
4	xxx	xxx	9.9
5	xxx	xxx	5.2
WCFR	1.3	1.7	1.5
N	399	401	793

Source: 1986 DHS
Note: xxx Sample size < 30

The preference trends highlighted by the measures presented in Table 7.5 are consistent with those displayed in Table 7.4. Nevertheless, two differences seem important. In the Northeast and São Paulo, a strong preference for a family with three children is observed, if information about the planning status of the last child is taken into account, and for a family with two if preference for the next birth is considered. It is likely that this difference is an effect of the posteriori rationalization of women who had already had the birth. In Rio, in both cases it is clear a preference for families with two children. but the estimate of the wanted mean family size of the synthetic cohorts is lower than that displayed in Table 7.4, by 0.6 children. In São Paulo, the reduction in the estimate of wanted family size provoked by this question is of 0.6 children as well and in the Northeast 0.5 children.

7.4-THE DESIRE FOR THE THIRD CHILD

As seen before, women's preferences in terms of family size are concentrated on two children in all regions. The preference for the next child also indicated a marked desire for two children A similar pattern was also found in Chapter 6, where *quintum* values by parity were estimated and pointed to a substantial parity effect in the progression to the third order. Although this pattern is similar in all regions, the largest regional differentials are in this progression rate, whether dealing with observed or with desired fertility.[322] This seems to be the watershed between the new and the old patterns of family formation. Hence, a more detailed analysis of the percentages of women with two children who expressed the desire to stop childbearing is carried out in this section. It starts with an evaluation of the impact of the variables considered in the analysis of desired mean family size on these percentages in Table 7.6. These percentages refer to women who reported the desire to stop childbearing at parity two. In order to avoid fluctuations caused by small sample numbers, the occupation and the opinion of the religious leader are not taken into account.

[322] In fact, the largest difference between Northeastern *quintum* and those for the other two regions refers to the progression to the fourth parity. However, the difference in the progression to the third parity is quite marked.

Table 7.6
PERCENTAGE OF WOMEN WITH TWO LIVING CHILDREN WHO WANT TO STOP CHILDBEARING BY SOCIO-ECONOMIC VARIABLES
Brazilian Regions

Variables	Rio de Janeiro	São Paulo	Northeast
Age Cohort			
20-29	74.4	63.4	51.7
30-39	81.0	78.0	73.6
Age at Marriage			
< Median	75.6	60.9	56.3
> Median	80.6	77.1	64.1
Schooling Years			
< 2	xxx	xxx	56.0
2-4	73.9	74.6	64.0
5 and more	87.2	72.4	60.5
Working Status			
No	84.2	72.2	65.6
Yes	73.1	67.6	49.2
Childhood Place of Residence			
Country/Town	xxx	69.4	55.1
City	77.2	71.3	66.7
Mass Communication Exposure			
Low	xxx	xxx	42.9
Medium	82.0	66.7	66.7
High	76.5	79.6	68.9
Health Services			
Low	xxx	xxx	41.4
Medium	79.4	64.3	50.0
High	xxx	68.7	64.9
Attendance at Religious Services			
Some	74.4	65.6	49.1
No	86.7	78.4	66.7
N	141	113	169

Source: 1986 DHS
Note: xxx Sample size < 30

Socio-economic variables played different roles according to region. A probably common effect was that produced by attendance at religious services. More women who went to Church wanted to continue childbearing at parity two than those who did not go. The effect is more marked in the Northeast. In fact, this area shows the largest impact for all the variables considered. The most marked effect is that produced by exposure to mass media, to health services and women's age. The effect of women's work status is to decrease the proportion of women who want to stop childbearing at parity two. Younger women with two children had a stronger desire to continue childbearing than did older ones. This was also observed in São Paulo.

It is likely that older women with two children are selected for stopping childbearing at this parity   In São Paulo, clear effects were produced by age at marriage, women's age, exposure to mass media and attendance to church (see Table 7.6). In Rio, the largest differential is found between women with a medium and those with a high education level. Attendance at religious service and women's current working status were also important. There, fewer non working women who wanted to continue childbearing than the working. Another important effect also in an unexpected direction is that produced by women's exposure to mass communication. Fewer women who were highly exposed (76.5%) reported the desire to stop childbearing at parity two than women who were in the medium category (82.0%).

The next step seeks to estimate the relative weight and statistical significance of specific characteristics of each region for the proportion of women who want to stop childbearing at parity two. A logistic regression is performed using this proportion as a dependent variable and a variable named *region* as independent which values are: Rio de Janeiro, São Paulo and the Northeast. This is controlled by all the socio-economic variables previously studied apart from husband's occupation and the opinion of the religious leader. Low small sample numbers only allow the disaggregation of attendance at church into two categories, some attendance and no attendance. As Rio has the highest percentage of women with two children who wanted to stop childbearing, this area is taken as the baseline, the point of comparison. Within this area the group of comparison was chosen to be that formed by the youngest cohort, who married later, were more educated, more exposed to both television and health services, grew up in cities and worked. Various models are tested for the explanatory variables. Table 7.7 presents the logistic regression coefficients and odds ratios for the five statistically significant models. First of all, the logistic regression coefficients and odds ratios are estimated without controls. Then variables being considered are included in the model, step by step. These variables are described in Table 7.8.

Table 7.7
LOGISTIC REGRESSION COEFFICIENTS AND ODDS RATIOS FOR THE EFFECTS OF *REGION* ON THE PERCENTAGE OF WOMEN WITH TWO CHILDREN WHO WANT TO STOP CHILDBEARING WITH DIFFERENT CONTROLS

Models	São Paulo		Northeast	
	Coefficient	Odds	Coefficient	Odds
No Control	-0.475	0.62	-0.943	0.39
Model 1	-0.348		-0.726	0.48
Model 2	-0.325		-0.632	0.53
Model 3	-0.300		-0.573	0.56
Model 4	-0.398		-0.643	0.52
Model 5	-0.346		-0.559	0.57

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

According to Table 7.7, with no control, a Northeastern woman had 61.0% less chance of desiring to stop childbearing at the second parity than did a Rio woman. In São Paulo, this chance is higher than in the Northeast but 38% lower than in Rio de Janeiro. Model 1 includes demographic variables; women's age and age at first union. This inclusion improves its significance and the coefficients and odd ratios are reduced indicating that part of the regional differences in the analyzed coefficients are due to differences in the two demographic variables. The difference between Rio and the Northeast was reduced to 52%. The São Paulo coefficient was not significant at 5%. Women's age showed the higher significance among the two covariates. Older women had 1.9 times more chance of wanting to stop childbearing at parity two than did younger ones. Table 7.8 presents the regression coefficients and odds ratios for the socio-economic covariates. The odds ratios are in brackets.

Table 7.8
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE SOCIO-ECONOMIC COVARIATES

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Age	0.631	0.647	0.727	0.798	0.674
	(1.88)	(1.91)	(2.07)	(2.22)	(1.96)
Age at Union	-0.180	-0.155	-0.129	-0.147	-0.067
Childhood Residence		-0.199	- 0.110	-0.137	-0.09
Low education			-0.624	-0.646	-0.652
			(0.54)	(0.52)	(0.52)
Medium Education			-0.303	- 0.258	-0.299
Working Status				0.658	0.615
				(1.93)	(1.85)
Low Media					-0.512
					(0.60)
Medium Media					-0.284

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

Model 2 incorporates women's childhood place of residence into the first model. This reduces the difference between the Northeast and Rio to 47% (see Table 7.7) but the *region* coefficient for São Paulo is not significant at 5%. Neither is the coefficient for childhood residence. Age is still significant at 1% (see Table 7.8). Model 3 incorporates women's education. The difference between Rio and the Northeast is further reduced, to 44% (see Table 7.7). Age is significant at 1% and women's education at 5%. Lowly educated women had 46% less chance of wanting to stop childbearing at parity two than highly educated women (see Table 7.8). Model 4 adds women's current working status and this also increased the significance of the model. However, the value of the *region* coefficient increased and the odds ratio decreased (see Table 7.7). This seem probably a result of the unexpected direction of the relationship. The non working women had more chance to want to stop childbearing at parity two than those working.

Model 5 includes the effect of mass communication exposure which slightly contributed to a reduction in the regional differences. In fact, the combination of variables included in this model produced the largest impact on the coefficients and odds ratios. The comparison of the odds ratio from this model for Northeastern women with that obtained from the no control model points to a reduction in the difference between the chance of a

Northeastern woman and a Rio woman desiring to stop childbearing at parity two from 61% to 43% (see Table 7.7). Only the coefficient for lowly exposed women to mass media was significant at the level of 5%. It indicates that lowly exposed women had 40% more chance to desire the third birth than did the highly exposed (see Table 7.8). The inclusion of exposure to health services and attendance to church reduces the significance of the model. Thus, they are excluded.

Finally, Table 7.9 presents the results of the best fit model, according to forward (FSTEP) and backward methods (BSTEP) set in the SPSS package. Both models take into account all the variables tried in the forced model. The results in terms of coefficients, odds ratios and significance are very similar in both models. The forward step model includes *region*, women's age and current working status. The backward step adds, apart from those variables, education. The *region* coefficients are significant at 1% and 5% for the Northeast and São Paulo, respectively. The impact of all included variables on the Northeast odds ratios compared to those estimated from the no control model is to increase them from 0.39 to 0.42 (FSTEP) or 0.44 (BSTEP) (see Table 7.8). By the same token, the odd ratio for São Paulo does not seem to be affected; they are estimated around 0.61. Summarizing, women's age, working status and education played some role in the regional differences in the percentage of women who wanted to stop childbearing at parity two. Nevertheless, the specific regional characteristics seem to play a major role.

Table 7.9
LOGISTIC REGRESSION COEFFICIENTS AND ODDS RATIOS OF THE BEST FIT MODELS FOR THE EFFECTS OF *REGION* ON THE PERCENTAGE OF WOMEN WITH TWO CHILDREN WHO WANTED TO STOP CHILDBEARING WITH DIFFERENT CONTROLS

Variables	FSTEP	BSTEP
São Paulo	-0.475	-0.496
	(0.62)	(0.61)
Northeast	-0.862	-0.822
	(0.42)	(0.44)
Age	0.636	0.748
	(1.89)	(2.11)
Working Status	-0.583	-0.602
	(0.56)	(0.58)
Low Education		-0.809
		(0.44)
Medium Education		-0.256
		(0.77)
Childhood Place		
Mass Communication		
Health Services		
Attendance to Church		

Source: 1986 DHS
Note: Coefficients and odds ratios not presented if $p > 0.05$

As previously seen, women's age has a strong effect on the proportion of women with two children who do not want to continue childbearing. This might indicate a effect of selectivity. It is likely that older women with two children will stop childbearing at this parity. In order to examine this effect, the planning status of the third living child is examined. The same models are performed again using the proportion of women with three living children who reported being the last birth unwanted as the dependent variable. The coefficients and odds ratios displayed in Table 7.10 refer to the no control model, where only the independent variable, *region*, is included, and to the two best fit models according to the SPSS package, FSTEP and BSTEP.

Table 7.10
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE EFFECTS OF *REGION* ON THE PERCENTAGE OF WOMEN WITH THREE CHILDREN WHO DID NOT WANT THE LAST BIRTH WITH DIFFERENT CONTROLS

Variables	No Control	FSTEP	BSTEP
São Paulo	-1.104	-0.563	-0.728
	(0.33)	(0.57)	(0.48)
Northeast	-1.384	-1.119	-1.148
	(0.25)	(0.33)	(0.32)
Low Media		-1.736	-1.449
		(0.18)	(0.23)
Medium Media		-0.378	-0.491
Working Status		0.324	
		(1.38)	
Low Education		-0.585	-0.613
		(0.56)	(0.54)
Medium Education		-0.349	-0.277
Attendance at Church			-1.117
			(0.33)

Source: 1986 DHS
Note : Coefficients and odd ratios not presented if $p > 0.05$

It may be seen that the variables considered played a more important role in the planning status of the third birth than in the proportion of women who wanted to stop childbearing at parity two, especially in São Paulo. For instance, with no control the chance of a woman desiring the third birth was 67% higher in São Paulo than in Rio de Janeiro. The best model using the FSTEP procedure reduced this difference to 43%. This model includes media exposure, education and working status. The *region* coefficients and odds ratios obtained through the BSTEP ratio is lower than that estimated by the FSTEP procedure. The included variables are the same except that the BSTEP includes attendance at Church and excludes women's working status. The Northeastern women had 75% less chance to want the third than the Rio de Janeiro's ones according to the no control model. This is reduced to 67% according to the FSTEP model. This ratio is very similar to those obtained with the BSTEP. Although the regional differences are reduced when some social characteristics are controlled, a large amount of the regional differential still persisted after these controls. This again lead the consideration of importance of the specific regional characteristics.

7.5- THE IMPACT OF STARTING CONTRACEPTION BEFORE THE FIRST BIRTH ON THE FERTILITY OUTCOME

It was seen in Chapter 4 that prevalence rates themselves did not explain the regional differences in fertility. Timing of life cycle at starting contraception seemed to be more important in explaining these differences. The hypothesis examined in this section is that a low proportion of unwanted fertility is obtained when families have an idea about the desired family size at an early stage of their reproductive cycle for instance, at marriage, and start to behave towards this target at that time. This means postponing of starting motherhood through an early use of contraception or later marriage. Although, it is clear that the final fertility outcome would not be the same target as there is some compound of fertility that is not explained by deliberate control, it is expected that the difference between actual and desired fertility will no be so large.

This section aims to investigate the impact of starting contraception before the first birth on the amount of unwanted fertility. A first is carried out in Table 7.11 through the comparison of desired and actual mean family size by parity at first use of contraception. Adjusted measures through a Multiple Classificatory Analysis and also unadjusted measures are shown. As expected, the unadjusted values indicate that women who started using contraception earlier reported a preference for a smaller family than those who started later in all regions. The range of variation was 0.5 children in Rio and the Northeast and 0.7 in São Paulo. The mean number of observed living children also increased with parity at starting. It is lower than the desired mean size up to parity one and much larger at a parity higher than two in São Paulo and the Northeast. In the Northeast, this difference reached 2.1 children among women who had at least two children when they started. In Rio, the desired mean family size was already reached by women who started contraception at parity one. There, the excess of children among women who started at parity higher than one was lower than in the other two areas. There is no clear pattern among women who had not started contraception. This might reflect age effects and sample fluctuations especially in Rio and São Paulo. These women might be selected for being younger.

Table 7.11
UNADJUSTED AND ADJUSTED DESIRED AND ACTUAL MEANS FAMILY SIZE BY PARITY AT STARTING CONTRACEPTION
Brazilian Regions

	Rio de Janeiro		São Paulo		Northeast	
Parity	Wanted	Actual	Wanted	Actual	Wanted	Actual
Unadjusted						
0	2.3	1.6	2.5	1.7	2.5	1.8
1	2.5	2.5	2.8	2.5	2.7	2.5
2+	2.8	3.8	3.1	4.3	3.0	5.1
Never	2.4	1.6	3.2	1.9	2.8	3.6
Range	0.5	2.2	0.7	2.6	0.5	3.3
Eta	0.2	0.5	0.2	0.6	0.1	0.5
Demographic Adjust						
0	2.3	1.7	2.6	1.9	2.5	2.2
1	2.4	2.5	2.7	2.4	2.7	2.8
2+	2.8	3.4	3.1	4.0	3.0	4.7
Never	2.4	1.4	3.1	1.7	2.8	3.5
Range	0.5	2.1	0.5	2.3	0.5	2.5
Beta	0.1	0.4	0.2	0.5	0.1	0.4
R^2	0.03	0.37	0.05	0.39	0.02	0.38
N	484		469		1,091	

Source: 1986 DHS

It is expected that both means, desired and observed family size, are affected by demographic variables; women's age and exposure time to childbearing. These variables were introduced in the analysis by quinquennium age-groups. The effects on the variability of both means by parity at starting contraception is analyzed through a Multiple Classificatory Analysis. The results are also displayed in Table 7.11. These variables do not seem to greatly affect the desired mean family size by parity at start. The estimated R^2 values are very low in all regions and the reduction in *Beta* caused by the inclusion of these variables is not clear. The reverse applies to the actual mean family size. The estimated R^2 values are much higher in all regions, around 0.37, and the reduction in *Beta* caused by the inclusion of these variables is more noticeable. Nevertheless, a comparison between the adjusted values (expected and observed) does not change the previous conclusions very much. The only exception is found in the Northeast where women who started contraception at parity one had already reached their desired mean family size. The differences between actual and desired fertility are reduced when adjusted values are considered but they are still largest in the Northeast and lowest in Rio de Janeiro.

Another attempt to evaluate the impact of parity at starting contraception on fertility preferences and outcomes is carried out in Table 7.12. Desired total fertility rates by parity at starting contraception are calculated using the Westoff method.[323] They are compared to the observed rates in order to estimate the amount of unwanted fertility. It was shown in Chapter 4 that parity at starting contraception affected observed fertility rates. Here, it is clear that it also affected desired fertility and consequently the amount of unwanted fertility. The effect is stronger on actual fertility and results in a larger amount of unwanted fertility among those who started contracepting at later stages of their reproductive life. The only exception may be seen in São Paulo where women who started contraception at later stages of their reproductive life showed a lower amount of unwanted fertility. This is due to a much higher desired fertility among women who started at parity higher than two than among those who started at parity one. The lowest amount of unwanted fertility is found in São Paulo for all categories and the highest in the Northeast. The results suggest that women who started contraception at an early stage in their reproductive life are more likely to achieve their desired family size. This also means lower fertility.

[323] It is also based on women's response to desired family size. The ideal number is compared to the actual number of living children and births in excess of the desired number are subtracted from the numerator of the age-specific fertility rates. See Westoff (1991), p 14.

Table 7.12
DESIRED TOTAL MARITAL FERTILITY RATES (DTMFR) AND TOTAL MARITAL FERTILITY RATES BY PARITY AT STARTING CONTRACEPTION
Brazilian Regions

Parity	Rio de Janeiro	São Paulo	Northeast
DTMFR			
0	2.0	2.4	2.6
1	2.1	2.5	2.8
2+	xxx	3.5	3.4
TMFR			
0	2.9	3.3	4.7
1	3.3	3.8	5.1
2+	3.8	4.2	7.1
% of Unwanted Fertility			
0	30.6	28.6	45.0
1	35.5	34.5	44.7
2+	xxx	16.3	53.0
Range	4.9	5.9	8.0
N	484	469	1,091

Source: 1986 DHS
Note: xxx =Sample size < 30

7.6 THE IMPACT OF CERTAIN VARIABLES ON STARTING CONTRACEPTION BEFORE THE FIRST BIRTH

Given the importance of parity at starting contraception on fertility desires and outcomes, this sub section attempts to identify the effect of the same set of variables being considered on this thesis on the proportion of women who started at parity zero, that is *planner* women. Table 7.13 presents these proportions. Health exposure is excluded as it is measured only for women who had at least one child. The husband's occupation was the variable which had an important and uniform effect in all regions on the early use of contraception. Women whose husband was a liberal professional had a much higher chance of becoming a *planner* than those whose husband was an agricultural worker. Women's age headed the list of the most important variables in Rio de Janeiro and São Paulo. Younger women were much more prone to start earlier than older ones. Regional differentials in the percentages of *planners* were more marked among the proportion of older women, showing Rio's women a much higher percentage, especially compared to the Northeast. This seems compatible with its lowest fertility where changes started somewhat earlier.

Table 7.13
PERCENTAGE OF WOMEN WHO STARTED CONTRACEPTION AT PARITY ZERO BY CERTAIN VARIABLES
Brazilian Regions

Variables	Rio de Janeiro	São Paulo	Northeast
Age Cohort			
20-29	59.4	53.5	25.4
30-39	36.7	29.7	9.0
Mean Age at Marriage			
< Median	40.1	34.1	16.7
> Median	57.2	46.7	22.3
Schooling Years			
< 2	49.3	xxx	13.3
2-4	53.1	46.9	27.4
5 and More	58.2	59.3	37.1
Husband Occupation			
Agricultural	xxx	xxx	9.0
Skill-unskilled	46.5	41.5	19.2
Sales & Service	55.4	41.5	26.2
Professionals	66.3	62.8	30.4
Working Status			
No	47.4	46.4	17.8
Yes	55.4	42.6	22.0
Childhood Place of Residence			
Country/Town	xxx	34.4	12.9
City	53.7	48.4	28.4
Mass Communication			
Low	xxx	xxx	14.5
Medium	43.9	41.2	23.9
High	60.4	54.4	39.3
Attendance at Religious Services			
Some	57.8	44.0	20.2
No	47.1	24.1	19.9
Religious Leader's Opinion			
Against	xxx	xxx	18.9
Favourable	45.1	52.1	28.4
No Opinion	46.1	45.6	17.8
N	249	203	214

Source: 1986 DHS
Note: xxx = Sample size < 30

Education is another important variable in all regions, especially in the Northeast (see Table 7.13). There, the largest impact was observed between women with less than two schooling years to two to four years. Age at marriage was also important in determining the percentage of *planner* women in Rio and São Paulo. Women who married later had a greater chance of starting contraception earlier than those who married earlier. Exposure to mass communication was very important in all regions. Highly exposed women were more prone to be *planners* than the less exposed group. This difference was largest in the Northeast. Childhood place of residence is another important variable affecting the chance of a woman becoming a *planner* in São Paulo and the Northeast, especially in the Northeast. Attendance at church was quite important in São Paulo followed by Rio de Janeiro.. A favourable opinion about family planning from a Northeastern religious leader seems to have positively affected the proportion of *planner* women there.

In order to investigate if the relationship observed between *planner* women and the two social actors, mass media and Church, is affected by their joint association of demographic and socio-economic covariates, a multivariate analysis is undertaken considering the effect of these two actors by turn and in each region. A logistic regression is appropriate because the dependent variable is dichotomous. The dependent variable, *planner*, is coded *1* if a woman started contraception before the first birth and *0* otherwise. The same set of covariates analyzed in Table 7.13 are considered in the analysis. This resulted in five forced models significant to at least 5%. The best model, according to the forward step in the SPSS package, is also performed. The point of comparison, the baseline, is the lowest exposed women, the lowest educated, the oldest women, those who married earlier, those whose husband worked in agriculture, women who grew up in towns or the country and those who were not working. The <u>no control</u> model only estimates the effect of exposure to mass communication on the chance of a woman becoming a *planner* without any control. By high exposure is considered women wiho watched television and read newspaper and by medium those who ansewered yes to only one of these two questions. The results are reported in Table 7.14 and the covariates included in the models are listed in Tables 7.15, 7.16 and 7.17.

Table 7.14
LOGIT REGRESSION COEFFICIENTS AND ODDS RATIOS FOR THE EFFECTS OF MEDIA EXPOSURE ON THE PROBABILITY OF A WOMAN STARTS CONTRACEPTION AT PARITY ZERO WITH DIFFERENT CONTROLS
Brazilian Regions

Model	Rio de Janeiro		São Paulo		Northeast	
	High	Medium	High	Medium	High	Medium
No Control	0.704	0.083	1.240 (3.47)	0.681	1.248 (3.48)	0.584 (1.79)
Model 1	0.757	0.211	1.155 (3.17)	0.559	1.247 (3.48)	0.625 (1.86)
Model 2	0.747	0.194	1.117 (3.06)	0.553	1.201 (3.32)	0.589 (1.80)
Model 3	0.790	0.274	1.000	0.473	0.904 (2.48)	0.410
Model 4			1.114	0.467	0.857 (3.05)	0.403 (2.36)
Best	0.757	0.210	1.153	0.712	0.840 (3.16)	0.423 (2.32)
N	436		424		719	

Source: 1986 DHS
Note: Odds ratios not shown if $p > 0.05$

Media as a whole was significant at the 1% level in all regions. However, the coefficients disaggregated for both categories of exposure are significant at the level 5% only in the Northeast. There, the effect was quite strong. A highly exposed woman had 3.48 times more chance of starting contraception at an early stage of her reproductive life than a lowly exposed one. The medium exposed had lower chances than the highly exposed but still much higher than the lowest group, by a factor of 1.79. The coefficient for high exposure was significant at 4.0% in São Paulo. It indicates that highly exposed women had 3.47 times more chance of becoming a *planner* than the lowly exposed.

Model 1 includes demographic variables, women's age and age at first union, as variables which control for the duration of exposure to the risk of conception. The results are also displayed in Table 7.14. The significance of the model is increased in all regions but only the value for the São Paulo coefficient was altered with the inclusion of the two variables. This suggests that the effect of media in a chance of a woman being a *planner* was slightly affected by women's age and age at marriage there. The coefficients for these two variables are significant in all regions. Older women had less chance of becoming a *planner* than younger women (see Tables 7.15, 7.16 and 7.17, for Rio de Janeiro, São Paulo and the Northeast, respectively). On the other hand, women who married later were more prone to starting contraception at an earlier stage of the life cycle. These effects seemed stronger in São Paulo and lower in the Northeast.

Table 7.15
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE SOCIO-ECONOMIC COVARIATES
Rio de Janeiro

Variables	Model 1	Model 2	Model 3	Best
Age	-0.905	-0.903	-0.923	-0.906
	(0.40)	(0.40)	(0.39)	(0.40)
Age at Union	0.837	0.835	0.844	0.836
	(2.31)	(2.31)	(2.32)	(2.31)
High Education		0.088	0.107	
Medium Education		0.049	0.031	
Women's Working Status			0.380	0.371
			(1.46)	(1.42)

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

Table 7.16
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE SOCIO-ECONOMIC COVARIATES
São Paulo

Variables	Model 1	Model 2	Model 3	Model 4	Best
Age	-1.502	-1.447	-1.459	-1.467	-1.548
	(0.22)	(0.24)	(0.23)	(0.23)	(0.22)
Age at Union	1.088	1.124	1.120	1.112	1.093
	(2.97)	(3.08)	(3.07)	(3.04)	(2.98)
High Education		0.824	0.712	0.697	
		(2.27)	(2.04)		
Medium Education		0.347	0.267	0.249	
Childhood Place			0.355	0.312	
Husband's Occupation					
Liberal Professional				1.011	1.063
				(2.74)	(2.90)
Skill-unskilled				0.209	0.217
Sales and services				0.312	0.334

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

Table 7.17
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE SOCIO-ECONOMIC COVARIATES
Northeast

Variables	Model 1	Model 2	Model 3	Model 4	Best
Age	-1.038	-1.039	-1.030	-1.028	-1.030
	(0.35)	(0.36)	(0.36)	(0.36)	(0.36)
Age at Union	0.557	0.531	0.513	0.522	0.543
	(1.74)	(1.70)	(1.67)	(1.68)	(1.72)
High Education		0.405	0.406	0.395	
		(1.50)			
Medium Education		0.110	0.052	0.039	
Childhood Residence			0.542		0.488
			(1.72)		(1.62)
Husband's Occupation					
Professional				0.476	0.516
				(1.61)	(1.67)
Skill-unskilled				0.412	0.429
Sales & services				-0.169	-0.207

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

Model 2 adds women's education to the previous model. This again improved the model in all regions but the coefficients for both categories of media are significant again only in the Northeast and for highly exposed women in São Paulo (see Table 7.14). Education slightly reduced these coefficients and odds ratios suggesting that the differences in the chance of a woman starting contraception at parity zero by media was also not affected by differences in women's education. The coefficients for both categories of education are significant only in São Paulo and that for highly educated women is significant in the Northeast (see Tables 15, 16, and 18). Highly educated had 2.27 and 1.50 more chance of becoming *planner* than the lowest educated in São Paulo and the Northeast, respectively. The effect of the other covariates is not altered.

Model 3 includes childhood place of residence in the Northeast and São Paulo and women's working status in Rio de Janeiro. Only the coefficient for Northeastern high exposure was significant and this showed a large reduction compared with that obtained from the non control model. The odds ratio declined from 3.48 to 2.48 suggesting that part of the difference in the chance of a Northeastern woman start contracepting before the first birth between exposed and non exposed women to media is affected by the place where she spent her childhood. Women who spent childhood in a city had 1.72 times more chance of becoming a *planner* than those who grew up in town or in the country. In Rio, working women had 1.46 more chance of becoming a *planner* than those non working.

Model 4 incorporates husband's occupation. This model was significant only in the Northeast and São Paulo. Women whose husband was a liberal professional had 1.67 and 2.74 times more chance in becoming a planner than those whose husband worked in agriculture in the Northeast and São Paulo, respectively. The results of the best fit models, according to the SPSS package, are also presented in Table 7.15, 7.16, 7.17 and 7.18. In Rio, included variables apart from the media are women's age, age at marriage and women's working status. The model for the Northeast included the same variables as the Rio one plus childhood place of residence and husband's occupation. Apart from childhood place of residence, the São Paulo model includes the same variables as those for the Northeast. Only the coefficient for high exposed women in the Northeast and São Paulo are significant at the 5% level. They indicated that Northeastern women had 2.32 times more chance of becoming a *planner* than the lowest exposed. As the coefficient obtained from the no control model is 3.48, it indicates that part of the relationship between the two variables are affected by the covariates included in the model. However, even with all these controls media still plays the most important role. It was suggested by these results that media played a stronger effect in São Paulo which was not very much affected by the other covariates. The odds ratios ranged from 3.47 (no control) to 3.17 (best model).

The next step is to study the effect of religiosity on the chance of a woman starting contraception before the first birth. Again, a logistic model is carried out for *planner* as the dependent variable, coded 1 if women started contraception before the first birth and 0 afterwards. Independent variables are attendance at church and the opinion of the religious leader about family planning. They are analyzed by turn and by each region. The same set of covariates used in the previous model are again considered. The first model considers attendance at church as an independent variable. This is recorded *0* if a woman attended to church at least once a month and *1* if she did not. The baseline is the same as used in the previous model including women who went to church. The model is significant at the 5% level only in Rio de Janeiro. Table 7.18 presents the results of the four significant models, three forced and the best model according to the FSTEP process. If a woman did not regularly go to the church she had 1.73 more chance of becoming a *planner* if she went. This relationship is not affected by all the controls introduced in the model. The variables included are women's age, age at marriage and education.

Table 7.18
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE EFFECTS OF CHURCH ATTENDANCE ON THE PROBABILITY OF A WOMAN STARTS CONTRACEPTION AT PARITY ZERO WITH DIFFERENT CONTROLS
Rio de Janeiro

Variables	No Control	Model 1	Model 2	Best
No Attendance	0.550	0.559	0.567	0.558
	(1.74)	(1.76)	(1.76)	(1.75)
Age		-0.991	-0.991	-0.991
		(0.37)	(0.37)	(0.37)
Age at Union		0.883	0.882	0.882
		(2.42)	(2.42)	(2.42)
High Education			0.049	
Medium Education			0.034	

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

The effect of religiosity on the percentage of woman becoming *planners* is also measured through the opinion of the religious leader about family planning. This considers three possibilities; no opinion, favourable to family planning and against family planning. It is assumed that women whose religious leader had no opinion are more secularised and more prone to the early control of reproduction. The baseline includes women whose religious leader was against family planning and the same set of control variables used in the media exposure model. They are shown in Table 7.19 as well as the coefficients and odds ratios. The effect of the opinion of the religious leader was significant only in the Northeast. It indicates that women whose religious leader did not have opinion about family planning had 1.68 times more chance of becoming a *planner* than those whose leader was against it. The inclusion of covariates resulted into three forced models. The third model coincided with the best fit model according to the SPSS package. The included variables are age, age at union, education and childhood place of residence .The coefficient for the opinion of the religious leader showed a rise after the controls suggesting that the differences in these covariates masked some differentials in the proportion of *planners* by the opinion of the religious leader. Although the coefficients for favourable opinion are not significant at the 5%. level, the signals point in the expected direction; women whose religious leader was favourable to family planning had more chance of becoming a *planner*.

Table 7.19
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE EFFECTS OF THE OPINION OF THE RELIGIOUS LEADER ON THE PROBABILITY OF A WOMAN STARTS CONTRACEPTION AT PARITY ZERO WITH DIFFERENT CONTROLS
Northeast

Variables	No Control	Model 1	Model 2	Best
No Opinion	0.521	0.651	0.747	0.823
	(1.68)	(1.92)	(2.11)	(2.27)
Favourable	0.118	0.113	0.002	0.114
Age		-1.214	-1.209	-1.231
		(0.30)	(0.30)	(0.29)
Age at Union		0.774	0.664	0.624
		(2.17)	(1.94)	(1.87)
Medium Education			0.068	0.079
High Education			0.891	0.809
			(2.44)	(2.27)
Childhood Residence				0.913
				(2.49)

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

7.7-CORRELATES OF REGIONAL DIFFERENCES IN THE PERCENTAGE OF *PLANNER* WOMEN

This section looks at the importance of specific characteristics of each region on the proportion of *planner* women. Again, a logistic regression is performed using this proportion as a dependent variable and *region* as independent, controlled by the socio-economic variables previously studied. The values for region are : Rio, São Paulo and the Northeast. As Rio women had the highest percentage of *planners*, they are taken as the baseline, the point of comparison. The Rio group considered is that composed of the oldest cohort, the more educated, those more exposed to mass communication, women who grew up in cities, who were working and those who married later. Table 7.20 presents the logistic regression coefficients and odds ratios of the statistically significant models. First of all, the logistic regression coefficients and odds ratios are estimated without control (the no control). In addition, the same set of variables that are being considered in this chapter are included in the models, step by step.

Table 7.20
LOGISTIC REGRESSION COEFFICIENTS AND ODDS RATIOS FOR THE EFFECTS OF *REGION* IN THE PERCENTAGE OF *PLANNER* WOMEN WITH DIFFERENT CONTROLS

Models	São Paulo		Northeast	
	Coefficient	Odds	Coefficient	Odds
No Control	-0.316	0.73	-1.251	0.29
Model 1	-0.309	0.73	-1.335	0.26
Model 2	-0.288	0.75	-1.048	0.35
Model 3	-0.228		-1.270	0.35
Model 4	-0.189		-0.954	0.38
Best	-0.203		-0.986	0.37

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

The results of the no control model suggest that a Northeastern woman had 71.0% less chance of starting contraception at parity zero than did a Rio woman. In São Paulo, this chance was higher than in the Northeast but 27% lower than in Rio de Janeiro. Model 1 incorporates demographic controls, women's age and age at first union. This inclusion improves the model' significance but the São Paulo coefficients and odd ratios are not altered. The Northeast's coefficient is increased slightly suggesting that part of the regional

differences in this coefficient are masked by differences in the two demographic variables. Both covariates are significant and point in the expected direction. Table 7.21 displays the regression coefficients and odds ratios for the socio-economic covariates.

Table 7.21
LOGISTIC REGRESSION COEFFICIENTS AND ODD RATIOS FOR THE SOCIO-ECONOMIC COVARIATES

Variables	Model 1	Model 2	Model 3	Model 4	Best
Age	-1.147	-1.116	-1.129	-1.123	-1.173
	(0.32)	(0.33)	(0.32)	(0.32)	(0.37)
Age at Union	-0.843	-0.844	-0.807	-0.801	-0.787
	(0.43)	(0.33)	(0.44)	(0.45)	(0.45)
Low Education		-0.589	-0.396	-0.331	
		(0.55)	(0.67)	(0.72)	
Medium Education		-0.098	- 0.045	-0.016	
Low Media			-1.087	-0.906	-0.909
			(0.33)	(0.40)	(0.40)
Medium Media			-0.571	-0.515	-0.471
			(0.56)	(0.60)	(0.62)
Childhood Residence				-0.433	-0.386
				(0.65)	(0.68)
Husband's Occupation					
Agriculture					-0.709
					(0.49)
Skill-unskilled					-0.518
					(0.59)
Sales & services					-0.295
					(0.75)

Source: 1986 DHS
Note : Odds ratios not presented if $p > 0.05$

Model 2 incorporates education into the first model. This reduces some of the regional differentials compared to the previous model (see Table 7.20). The coefficient for low education is significant at the 0.5% level but that for medium education is not (see Table 7.21). Model 3 adds women's exposure to mass communication which did not contribute to the reduction of the regional differences. The coefficients for both degrees of exposure were significant at the 5% level. Model 4 includes the effect of childhood place of residence. This slightly contributed to the reduction in the difference between Rio and Northeastern women in their chance of becoming a *planner*.

Table 7.20 also presents the results of the best fit model (FSTEP) set into the SPSS package, also taking into account all the variables used in the forced model. The best model includes *region*, media, husband's occupation, women's age and age at marriage. The comparison of the odds ratios estimated by this model with those for the no control also suggests some reduction in the regional differentials between the Northeast and Rio de Janeiro after control. The odds rations increased from 0.29 to 0.37. All the coefficients of the covariates are significant at the 5% level. Few variations are observed in the São Paulo's coefficient. Summarizing, women's age composition, age at marriage, exposure to mass media and their husband's occupation played some role in the regional differences in the percentage of *planner* women. However, specific regional characteristics again seem to had played the major role.

7.8-SUMMARY

The analysis carried out in this chapter suggested that the preference for a small family was well established in the three study areas. Some indication of a time period decline in the desired mean family size after the 1960s was found. This seemed to be less marked in Rio de Janeiro as at that time the desired family size was already below three. A clearer decline took place among São Paulo and Northeastern women in the 1970s, especially in the latter area. Independent of the fertility preference measures considered, families with two children seemed to be largely preferred by most women in all regions, according to 1986 DHS data. Nevertheless, the regional difference in the proportion of women who reported a preference for a family with two children, who wanted to stop at parity two or who did not planned the third borne child were large. So too were the differences by socio-economic variables.

The progression to the third birth seems to be the watershed between the new and the old pattern of family formation. No indications were found that the regional differences in the preference for the third birth, either as measured by the desire for the next birth or by planning status of the last child borne, were explained by the regional differences in the socio-economic considered or y the differentiated role played by the social actors also considered. Women's age, working status and education affected more these preference and explained part of the regional difference. The influence of specific (cultural) characteristics of the regions was much stronger on these preferences than were

all the covariates. This makes hard to think of convergence in fertility levels. Although motherhood and a family with two children seemed to be a general pattern, some hint of differentiation was found. For instance, several measures point to a relatively high percentage of women who wanted to be childless in the Northeast. The same measures indicate a slight trend in preferences for a one child family in Rio de Janeiro.

Although preferences for a small family size seemed well established, there were still some difficulties in translating these preferences into effective outcome in all regions. A large proportion of unwanted fertility was found, especially in the Northeast and among women who started to contracept at a later stage of their reproductive life. This suggests that the bulk of the regional fertility differences between the Northeast and the two other areas was due more to the implementation of women's fertility preferences than to differences in preferences themselves. This is expected in an intermediate stage of fertility transition.

In explaining women's attitudes towards the achievement of this target, strategies of contraception were considered. These looked more important in reducing the amount of unwanted fertility than did prevalence in itself. Women who started earlier, *planner*, had more likelihood to achieve their desired family size than those who started later. Exposure to mass media affected this likelihood in all regions. Highly exposed women had much more chance to become a *planner* than other women in all regions. Women's age, age at marriage and their education were also important. The husband occupation had some importance in São Paulo and the Northeast. Also did place where women spent their childhood in the Northeast. Attendance at church played an important role in Rio as well as women's working status and the opinion of the religious leader in the Northeast. The impact of these variables was not enough to reduce the regional differences in this proportion. Summarizing, to be a *planner* women, which was suggested to be an important condition for the achievement of the desired fertility, seemed to be a new behaviour practised by the youngest cohort, more educated, more exposed to mass communication and who also married later.

CHAPTER 8

THINKING OF THE FUTURE: Will fertility converge?

8.1-INTRODUCTION

As discussed in Chapter 1, the classical version of demographic transition theory states that the development of an urban industrial society brings about improvements in living standard and diffuses the ideal of a small family. It is implicit in the theory that all societies that reach this phase of development will converge to this family pattern. Certain amendments suggest an inversion in this relationship; fertility decline may lead to the improvement in living conditions. Thus, in many situations, the necessary means for promoting the fertility decline have been shifted from the improving living conditions to governmental policies. This concern added to the fast fertility decline observed in most Third World countries has raised the issue of the emergence in these countries of the same demographic pattern of family formation observed among the developed countries. In other words, it suggests a convergence in fertility rates. Although it is not explicit at which rate fertility would converge, the replacement rate has been widely identified as this rate.[325]

The experience of the three studied areas analyzed in previous chapters indicated a dramatic decline in fertility. However, there were still quite marked regional differences in 1986, especially between the Northeast and the other two areas. Fertility differentials by socio-economic groups were also quite large. Standardization analysis performed in this thesis indicated an important role played by regional differentials in education, income, place of residence and women's working status on fertility differences. Nevertheless, specific regional characteristics also exerted a strong influence on total fertility rates, through fertility preferences and strategies. Hence, the hypothesis examined in this chapter

[325] See for instance the population projections of the World Bank.

is that although fertility is declining and bringing about smaller families in the three areas, there are no grounds for assuming convergence in fertility rates in a near future.

The first objective of this chapter is to analyze fertility trends and patterns of family formation for the three areas in the more recent period, 1986-92, looking for some indications of convergence in these trends towards Rio's fertility. The second objective is to discuss future fertility trends also looking for some indications of regional convergence in fertility. As the 1991 Census results have not yet come out, three different data sources are used here. The 1991 DHS is used for the analysis of the Northeast. Information about Rio de Janeiro and São Paulo's fertility trends are obtained from the 1992 General Household Survey (PNAD). Also published data from a survey about sterilization carried out in the municipality of São Paulo in 1992 is taken in account. The 1986 DHS data is used for comparisons.

The chapter is divided into seven sections, being this the first one. Section 8.2 focus on recent fertility trends in the three studied areas. Section 8.3 discusses the proximate determinants that brought about the fertility decline. Section 8.4 offers a brief analysis of the Northeast women's preferences and attitudes towards the ideal family size. An evaluation of regional fertility differentials is undertaken in section 8.5. Section 8.6 discusses future perspectives for the narrowing of regional differences. Section 8.7 summarizes the results.

8.2- FERTILITY TRENDS: 1986-92

The objective of this section is to describe the fertility behaviour between 1986 and 1992 in the three studied areas. This comprises basically a description of fertility decline by age groups and offers some hints of changes observed in patterns of family formation. It is based on the 1992 General Household Survey (PNAD) and the 1986 and 1991 DHS surveys.

8.2.1 Fertility Decline

The last quinquennium of the 1980s saw an acceleration of the fertility decline in all regions. In the Northeast, the total fertility rate declined from 5.1 (1986) to 3.8 (1991). In São Paulo, the decline was from 2.6 to 2.3 and in Rio de Janeiro from 2.2 to 1.8

during 1986-1992 . In Rio, these rates reached a value below the replacement rate and in São Paulo a very close value. The comparison of the age specific fertility rates between 1986 and 1991 or 1992 in Figure 8.1 indicates that all age groups experienced a decline in fertility in all regions except the 15-19, whose fertility slightly increased. In Rio and São Paulo, the curve peaked at the age group 20-24 in the two yeras. The largest reduction was observed among women aged 30-34. In the Northeast, the curve peaked at the age-group 25-29 in 1986 and at the group 20-24 in 1991. The reduction was more accentuated among women aged 35-39.

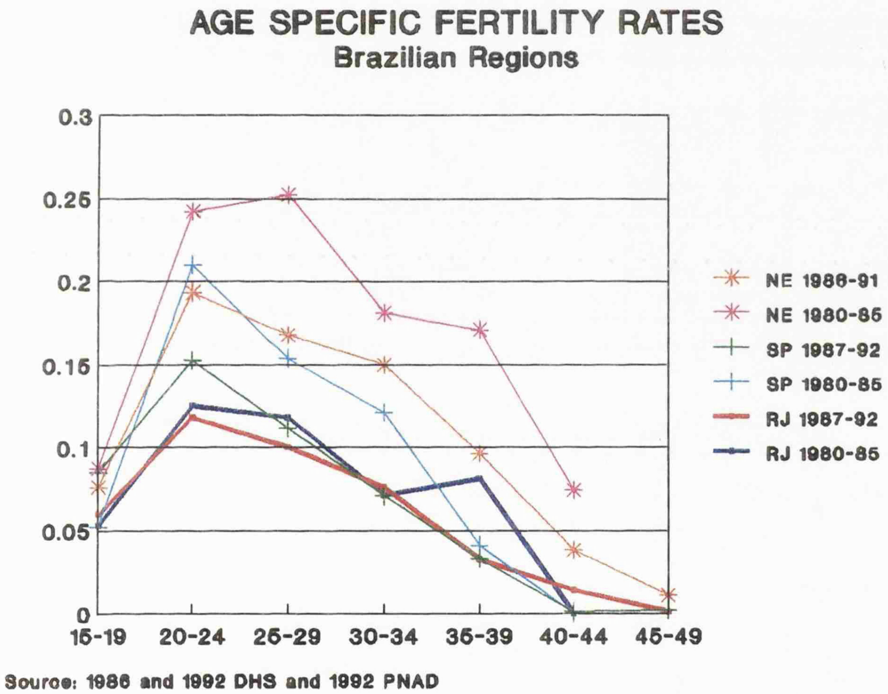

Figure 8.1

For the Northeast, it is possible to estimate marital fertility rates for 1991. The total marital fertility rate fell from 7.4 to 5.2 during this period. The age specific marital specific fertility rates also indicate a more marked fertility decline observed among older women.[326] This is confirmed by the estimates of Coale-Trussell's indexes. The index of marital fertility control, *m*, increased from 0.350 to 0.519 and *M* declined from 0.705 to

[326] Data not shown.

0.610. As it will be seen in the following sections, a dramatic increase in contraceptive prevalence was observed therein the period.

8.2.2 Changes in Patterns of Family Formation

Analysis of patterns of family formation is possible only for the Northeast since a DHS survey was undertaken there in 1991. It starts with the onset of reproduction, considering age at first union and at first birth. Both indicators declined over the period: age at first union from 20.5 to 20.0 years and age at first birth from 21.2 to 21.0 years. The difference between the two increased from 0.7 to one year, pointing to a growth in the length of the first birth interval.

The second component of the family formation process is the progression to births of higher orders. Figure 8.2 presents the parity progression ratios of married women aged 40-44 in the two surveys. Although these women had not quite completed their reproductive experience, they were picked in order to get comparable information in both surveys. Apart from the first and second births, all the other parity progression ratios declined between 1986 and 1991. The largest decline was observed at the sixth parity. The 1991 curve has a well-defined convex shape indicating a parity control fertility pattern. However, the most marked change was the increase in the proportion of women who had children . The effect of these changes on the mean family size was to reduce it from 6.1 to 5.4 children. The standard deviation also declined from 3.2 to 2.8 indicating a greater concentration of the distribution around the mean.

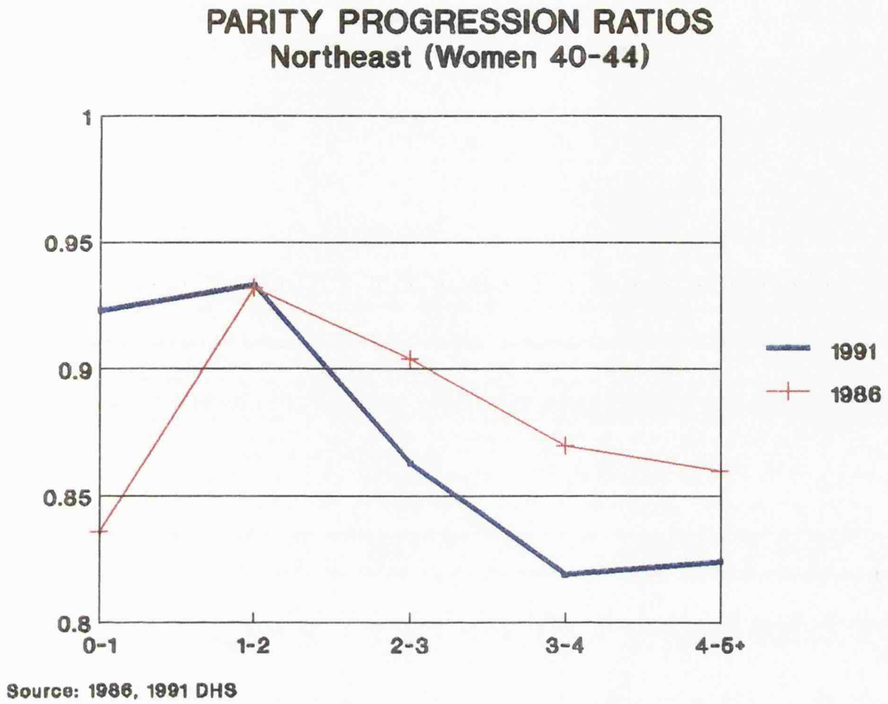

Figure 8.2

Parity did affect the progression ratios. The largest effect was that observed in the percentage of women with two children who went on to the third either in 1986 or in 1991. In 1991, the proportion of women with one child who went on to the second was 95.0%. That for women with two children who went on to the third was 87.1%. For São Paulo an indicator of changes in attitude towards a small family can be extracted from the proportion of first births in all births. This increased from 39.0% to 47.2% between 1980 and 1992.[327]

As seen in Chapter 6, sterilization was very important in reducing the span of reproductive life in 1986. Compared to 1986, the proportion of Northestern sterilized women in 1991 increased from 24.4% to 32.3% and the mean age at sterilization declined from 32.9 years to 30.5 years and the median age fell from 30.5 to 28.4 years. This means a reduction of 2.4 or 2.1 years in the span of reproductive life, assuming no differences in

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[327] See Campanário and Yazaki (1994b) p 43.

the onset of reproduction among the two surveys. Also, the mean parity at sterilization was lower in 1991 (4.6) than in 1986 (5.0), suggesting sterilization at lower fertility.

8.3 THE PROXIMATE DETERMINANTS

The analysis of the proximate determinants of the fertility decline is carried out for the Northeastand in a brief way for São Paulo using the 1991 DHS data and from a survey for the municipality of São Paulo. After a quick analysis of each proximate determinant individually in the Northeast, their combined impact on the 1986-91 fertility decline is evaluated. The methodology used for the estimation of the impact of the proximate determinants on fertility is the Bongaarts indexes as proposed by Casterline et al (1984) and used in Chapter 4.

The first determinant considered is nuptiality. This presented few variations during the period. In 1991, 35.6% of the surveyed women were single, 48.2% married, 8.7% lived in consensual unions and 7.5% reported themselves widows, separated or divorced. This means a reduction in the proportion of women in any kind of union by 1.0%. The median age at first union declined from 20.5 to 20.0 years. Hence, the marriage inhibiting effect on fertility was slightly lower in 1991, 29.7%, than that estimated for 1986, 31.5%. This would have led to a slight increase in the total fertility rate, from 5.1 to 5.2, in the absence of changes in the other determinants. Table 8.1 compares the estimates of inhibiting impact of Bongaarts indexes on the 1986 and 1991 TFRs.

Table 8.1
ESTIMATES OF THE INHIBITING IMPACT OF BONGAARTS INDEXES ON TFR (%)
Northeast: 1986-91

Components	1986	1991	Change
Marriage	31.5	29.7	-5.7
Contraception	50.6	56.0	10.7
Abortion	3.1	8.1	61.3
Breastfeeding	8.5	12.7	49.4
Observed TFR	5.1	3.8	-25.4

Source: 1986 and 1991 DHS

The most important proximate determinant of Northeastern fertility decline was contraception. Its inhibiting effect was, in 1991, 10.7% higher than that estimated for

1986. This was a result of an increase in the prevalence rate, from 52.9% to 60.7%, and of marked changes in the mix of methods used (see Table 8.2). The percentage of sterilized married women increased from 24.6% to 32.3%. The pill remained the second in the rank of women's preferences but the percentage of users declined from 17.3% to 14.7% between the two surveys. As a result of the increase in prevalence and changes in the mix of methods, the effectiveness percentage increased from 90.4% to 93.0% and the degree of protection from 47% to 57%.

Table 8.2
PERCENTAGE OF MARRIED WOMEN CURRENTLY USING DIFFERENT CONTRACEPTIVE METHODS
Northeast: 1986-91

Method	1986	1991	% Change
Female Sterilization	24.5	37.7	50.8
Pill	17.2	14.7	-15.0
IUD	0.1	0.3	200.0
Withdraw	4.3	2.9	-32.6
Periodic Abstinence	4.5	2.4	-46.7
Male Sterilization	0.2	0.1	-50.0
Condom	0.5	1.4	54.5
Other	1.6	1.2	-31.3
All	52.9	60.7	14.7

Source: 1986 and 1991 DHS

The third determinant considered is the post-partum non susceptible period. Amongst its three components, breastfeeding, amenorrohea and sexual abstinence, breastfeeding was the most important but even so it was not that important. The mean duration of breastfeeding increased from 5.5 to 9.5 months over the period. Nevertheless, the median declined from eight to six months. This indicates a more concentrated distribution at low duration. As the Bongaarts indexes were calculated using the mean, they point to an increase in the inhibiting effect of breastfeeding on fertility, from 8.5% in 1986 to 12.7% in 1991 (see Table 8.1).

The last component analyzed is abortion. The abortion rates shown here relate to abortions performed in the last five years and include induced and spontaneous ones. Among all married women aged 15-49, 12.1% experienced at least one abortion. For the last three years before the survey, the estimate abortion rate was 2.6%. The effect of abortion on fertility rates was to inhibit 8.1% of the total fecundity rate. This index is slightly higher than that estimated for 1986 which might be a result of better reporting.

Data from a survey carried out in the municipality of São Paulo in 1992 point to a contraceptive prevalence rate of 77.0% among the ever married women in this area.[328] If this rate is taken as a proxy for the prevalence rate of the state, an increase in prevalence by 7.8% from 1986 to 1991 may be estimated. It seems reasonable to assume this similarity as the TFR of the two areas were very similar at that time. These rates were 2.3 and 2.4 for the state and the municipality, respectively. Published information about mix of method refers to all women aged 15-50. The pill was slightly more preferred to sterilization among these women.[329] Among the non sterilized women, 39% reported willingness to be sterilized, suggesting a future increase in this percentage.[330]

8.4 FERTILITY PREFERENCES AND ATTITUDES

This section investigates if the fertility decline observed in the last half of the 1980s was a result of changes in preferences or a more effective attitude towards a small family. This kind of analysis is possible only for the Northeast. Table 8.3 displays some family size preference measures for 1986 and 1991. They are the same as those estimated in Chapter 7 and refer to ever married women who did not report being infecund or pregnant at the time of the survey. Apart from the reported ideal mean family size, all measures point to a reduction in the desired family size. The percentage of women who reported wanting a family with three or more children declined from 49.6% to 43.0%. Other measures also point to an increase in the proportion of women who did not want to have more than three children. For instance, fewer women with two children wanted to have a third and a lower proportion of women with three children had desired the last birth.

[328] See Berquó (1994), pp 21-2. All information from this survey was disaggregated by white and black women. Thus, all figure presented here is a weighted average of these two figures.

[329] See Berquó (1994), p 22.

[330] See Berquó (1994), p 24.

Table 8.3
FAMILY SIZE PREFERENCES
Northeast: 1986-91

Measures	1986	1991	% Change
Ideal Mean Family Size	2.8	2.9	+3.5
% Wants 3 or More	49.6	43.0	-15.3
% Want a 3rd[(1)]	31.3	26.9	-16.3
% Who Wanted a 3rd[(2)]	66.1	51.7	-27.8

Source: 1986 and 1991 DHS
Note: [(1)] Women with two children
[(2)] Women with three children

Changes in women's attitudes towards a smaller family size is clear. There was a rise in the percentage of women using contraceptives. The percentage for women who were contracepting to *control* their families rose from 59.1% to 88.6%. It means women who reported the desire of stopping childbearing. The comparable percentage for women who wanted to *space* increased from 41.0% to 42.2%. This refer to women who wanted more children and were contracepting. Variations in the time at starting contraception, measured by parity at first use, were not very marked. Compared to 1986, slightly more women started contraception at an earlier stage of their reproductive life (see Figure 8.3). The percentage of *planners*, defined as the percentage of women who started using contraception before the first birth, increased from 20.4% to 22.8%. Another increase was observed among women who started after two or more children, probably looking to *control* their families. This increase was a result of a reduction in the percentage of women who never contracepted, from 25.0% to 22.8.%.

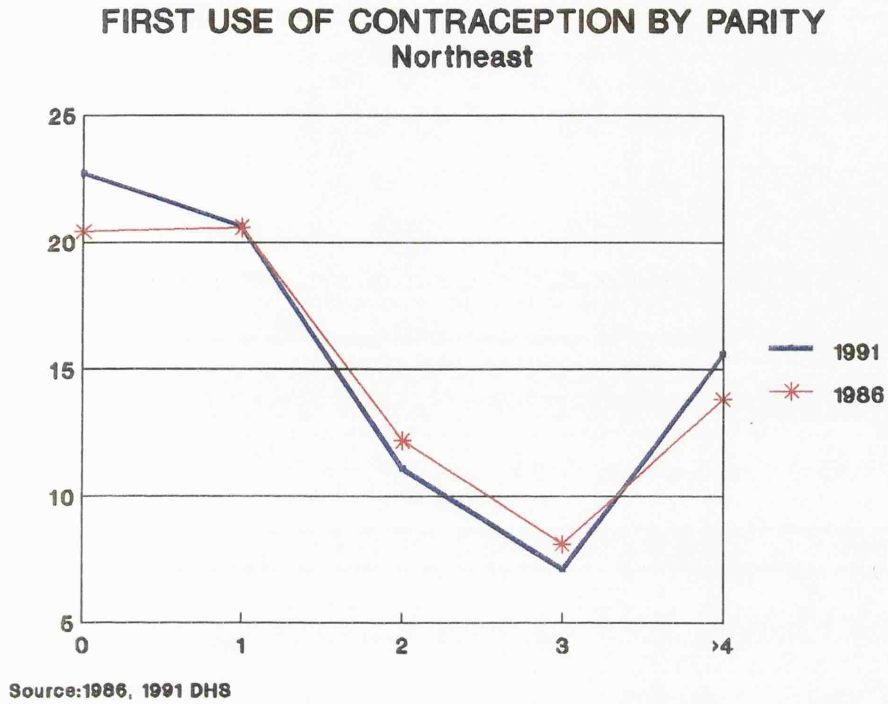

Figure 8.3

Measures of desired and observed fertility by parity at starting contraception are displayed in Table 8.4. Both fertility rates and the amount of unwanted fertility increased with parity at starting contraception. This reinforces the hypothesis previously raised that the timing at starting contraception affects the achievement of desired fertility. Compared to the results presented in Chapter 7, the largest reduction in desired fertility took place among women who started using contraception before the first birth, *planner* women. These women wanted 2.6 children in 1986 and 2.2 in 1991. As their observed fertility also declined, the amount of unwanted fertility was reduced from 45.0 to 34.3%. On the other hand, the largest reduction in observed fertility was found among women who started after the second birth, *controller,* whose fertility declined from 7.1 to 5.5 and the amount of unwanted fertility felt from 53.0% to 45.5%. Little variation was observed among the desired fertility of women who started after the first birth. Nevertheless, their observed fertility declined from 5.1 to 4.4 and the amount of unwanted fertility dropped from 44.7% to 38.6%.

Table 8.4
DESIRED AND OBSERVED TOTAL MARITAL FERTILITY RATES BY PARITY AT STARTING CONTRACEPTION
Northeast: 1991

Parity	Desired	Observed	Unwanted Fertility (%)
0	2.3	3.5	34.3
1	2.7	4.4	38.6
2	3.0	5.5	45.5

Source: 1991 DHS
Note: Excluded pregnant and infecund women

8.5-REGIONAL DIFFERENCES

The fertility decline that took place during the second half of the 1980s in all areas was indeed dramatic. Relatively speaking, it was higher in the Northeast and lower in São Paulo. The question raised in this section is whether this decline indicates convergence in fertility levels. In others words, will the regional differentials in TFR be reduced? Table 8.5 shows some indicators of reproductive behaviour for the three areas. It may be observed that there were still quite large regional differentials as the Northeast TFR was 1.9 children higher than the Rio one. The relative difference between Rio and São Paulo's TFRs increased over the period.

Table 8.5
INDICATORS OF REPRODUCTIVE BEHAVIOUR
Brazilian Regions

Indicators	Rio de Janeiro		São Paulo	Northeast
	1986	1991	1991	1991
TFR	2.2	1.8	2.3	3.7
Median Age at Marriage(1)	21.8			20.0
Median age at First Birth(1)	22.9			21.0
Median age at Sterilization	30.2			28.4
Prevalence (%)	69.2		77.0	60.7
% *Spacers*	51.8			42.2
% *Planners*	55.9			22.7
% *Controllers*	79.8			88.6
Wanted TMFR	2.3			2.7
% Unwanted Fertility	25.7			36.8

Source: 1986 and 1991 DHS
Note: (1) Life table measures

Indicators of processes of family formation for Rio in 1986 and the Northeast in 1991 are compared in Table 8.5. Northeastern women started reproductive life through marriage 1.8 years earlier than Rio women in 1986 and 1.9 years if the first birth is considered as onset of reproductive life. The proportion of Northeastern women who reported to be contracepting for spacing was lower than that observed in Rio and the percentage of *planner* women were much higher in Rio de Janeiro Nevertheless, if stopping is measured by sterilization, Northeastern women stopped earlier than those who lived in Rio de Janeiro and this counterbalanced the earlier onset observed there. Difference in the desired TMFR between Rio and the Northeast was also important, despite the decline observed in the Northeast. The same applies for the differences in unwanted fertility.

There was some evidence that prevalence also increased substantially in São Paulo. In 1986, the percentage of *spacer* women was even higher there than in Rio, 59.1%, but the percentage of *planners* was lower.The fertility decline observed in São Paulo during 1986-91 resulted in a fertility rate slightly higher than the 1986 desired total fertility (2.2).[331]

8.6-FUTURE FERTILITY TRENDS

An attempt at estimating future fertility trends is carried out in Table 8.6. This also looks at convergence in fertility rates. It is assumed that 90% of women who were not using any method but, who reported to the 1986 DHS an intention to contracept will eventually use contraception. A failure of 10% between intentions and practice caused by fear of side effects, objections from husband, difficult access to sources, etc, is also assumed. This would increase prevalence rates by 22.6% in the Northeast, 15.1% in São Paulo and 13.7% in Rio de Janeiro compared to 1986 rates. It is considered that 80% of women who reported the desire of stopping childbearing and had the intention of using some method will be sterilized. The expected increase in the sterilization rate is 10.5%, 4.6% and 4.7% in the Northeast, São Paulo and Rio de Janeiro, respectively. The residual intention in prevalence is expected to be fulfilled by other methods, mostly the pill. An effectiveness rate of 0.85 for these methods is assumed. Using these measures, the

[331] This is "the Westoff" desired marital fertility rate adjusted by the proportion married. See Table 8.10.

Bongaarts' indexes of contraception are forecast for all regions. Based on these and the indexes for the other determinants estimated for 1986,[332] total fertility rates are projected.

Table 8.6
INDICATORS OF FUTURE REPRODUCTIVE BEHAVIOUR
Brazilian Regions

Indicators	Rio de Janeiro	São Paulo	Northeast
% Expected Increase			
Prevalence	13.6	15.6	22.6
Sterilization	4.5	4.6	10.5
Other Methods	9.1	11.0	12.1
Prevalence (%)	83.3	86.4	74.4
Effectiveness (%)	76.3	78.7	
C_c	0.198	0.173	0.328
Projected TFR	1.4	1.6	3.4

Source: 1986 DHS

The projected TFRs displayed in Table 8.6 suggest a marked fertility decline in all areas if fertility intentions are achieved. This would lead to fertility rates much lower than replacement levels in Rio and São Paulo, lower than the desired fertility estimated for 1986. Although a large decline is expected in all areas, regional differentials are also expected. The estimated coefficient of variation, 60%, is higher than that estimated for 1970-75, 51.4%. It is worth noting that these projections are based on reproductive intentions. It is likely that difficulties in achieving these preferences such as contraception failure, contraception access, etc, are regionally differentiated which would, if taken into account, increase the differentials.

Another attempt is carried out here to speculate about future family composition. This is done only for the Northeast through parity progression ratios calculated for the synthetic age cohorts according to the Brass (1985) method and using the 1991 DHS. Small sample numbers do not allow an estimate using the 1986 DHS. As the method allows the estimation of women with *n* and more children, parity progression ratios are derived from these proportions. The results are displayed in Figure 8.4 for the five age cohorts at the survey time, 20-25, 25-30, 30-35, 35-39 and 40-45 years. They show that although the proportion of women who will have at least one birth at the end of their

[332] See Chapter 4.

reproductive life may decline, motherhood will be achieved by at least 90.5% of them. The probability of a woman who had a first birth going to the second is approximately stable, except for the youngest cohort who showed a marked decline. The most dramatic decline is observed in the progression to the third birth. As a consequence, it is expected that about 50% of women aged 20-24 and 25-29 will finish their reproductive life with two children. The comparable percentage for women aged 40-44 was less than 20%. The cohort rates implicit in these proportions point to an acceleration of fertility decline. A reduction from 3.9, for women aged 40-44, to 2.7 for women aged 20-24 is forecast.

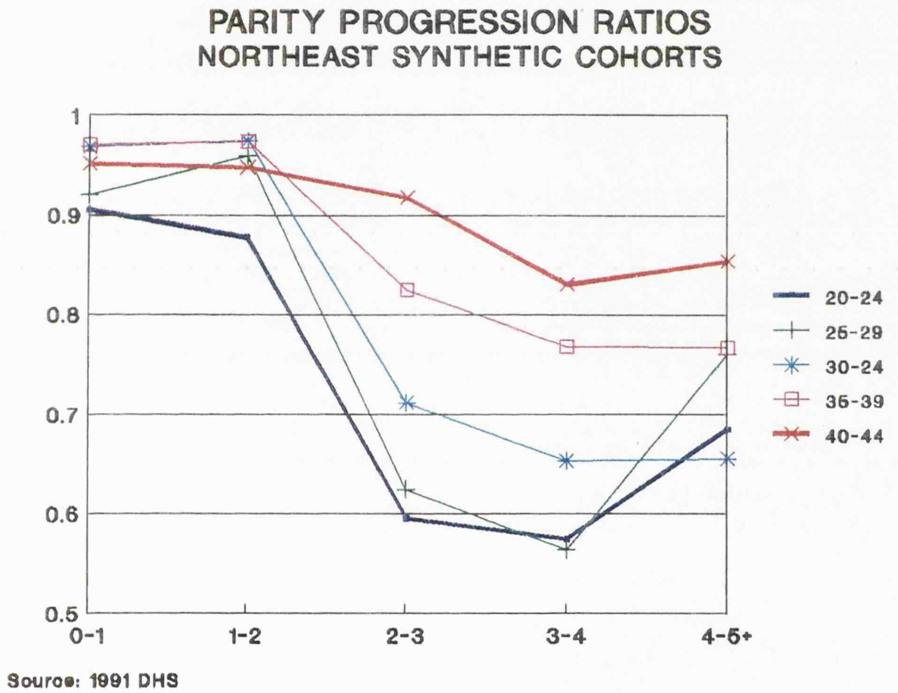

Figure 8.4

8.6-SUMMARY

The more recent fertility trends point to an acceleration of fertility decline in the three studied areas in the second half of the 1980s. The importance of the third birth as the watershed between the new and old family building patterns in all regions was stressed. It may be expected that in the near future more and more families will not have more than two children. However, motherhood seems to continue to be universal. It is a matter of reproduction of societies. Although fertility has declined in all regions, regional differences in the total fertility rates were still marked and are likely to continue. There were important differences in the patterns of family formation as the onset and the strategies of contraception. These played an important role in fertility differentials.

It is clear that the Northeast fertility decline was reached through a large increase in the proportion of sterilized women. In 1991, the Northeastern median age at sterilization was lower than that observed in 1986 in Rio de Janeiro. Changes in the onset of reproduction were in a sense of broughting it forward. Information for São Paulo in 1992 suggested a future increase in the percentage of sterilized women as 39% of the non sterilized women reported willingness to be sterilized. This means a shortening in the span of reproductive life.

Indications of a continuation of fertility decline in the near future in all regions have been suggested. Fertility rates may reach levels below replacement in Rio and São Paulo. However, there are no indications of a convergence in fertility rates and even that this convergence would be achieved at the replacement level. In Souza's words, "from the beach, the sky looks as if it encounters the sea at the horizon."[333] However, the horizon is an imaginary line.

[333] See Souza (1990), p 21.

Chapter 9

CONCLUSIONS

The review of the literature on fertility transition presented in Chapter 1 focused on four points; the concept, the descriptive, explanatory and predictive powers of demographic transition theory. In brief, fertility transition is understood to mean the passage from *natural* to *controlled* fertility. Coale's (1973) three conditions define this passage as a shift in the mechanisms of reproductive process control from institutional arrangements, society's marriage system, family organization and property systems, to *individual choice* motives. This shift results in a <u>sustainable</u> fertility decline until very low levels are achieved. Although it has not been made explicit by the literature at which rates fertility transition will be achieved, the replacement rate has been widely accepted as this rate.

The decline in mortality and increasing modernization are considered by the classical version of demographic transition theory the driving element in bringing about fertility decline. The difficulty in explaining the fertility decline in non modernized areas resulted in amendments to the classical view. The most important amendments stress the role played by cultural factors and diffusion of the value of small family size. A common point in all views is the association of fertility transition to new behaviour (*innovation*) characterized by deliberate fertility control. The recognized strategy for the achievement of fertility transition has been an earlier *stopping* of reproductive life. Fertility decline in pre-transitional times is regarded as an *adjustment* to a decline in mortality. It was a result of longer *spacing* which has been associated with lack of deliberate fertility control.

The empirical fertility analysis carried out in this thesis for three different Brazilian socio-economic regions over the twentieth century pointed to a dramatic decline in fertility in all regions. Fertility trends presented similarities among regions but a single pattern was not identified for the period analyzed. The first similarity is in the three phases that summarize Rio de Janeiro's and São Paulo's fertility trends. They consist of a decline in fertility followed by an increase and then a faster decline. This pattern is true when total and marital fertility are observed. The duration of each phase varied between the two areas.

Since the earliest available data, i.e. the beginning of this century, Rio de Janeiro has exhibited the lowest fertility rates. Its pattern of family formation can be distinguished from those of other regions at that time by the later onset of reproduction and by lower probabilities of progression to high parity births. However, there was no evidence that a parity-related fertility control regime had started there before the 1930s. Indications of a rise in fertility before the first fertility decline, early in the century were found. It is clear that during the 1930s fertility became more parity dependent and women aged 30 and over experienced very low fertility rates compared with the pattern of natural fertility assembled by Coale and Trussell. This suggests an earlier *stopping* of reproductive life which is associated with the presence of fertility control. The relatively low progression to the third birth already hinted at a preference for families with two children at that time. Fertility rose during the 1950s as a consequence of lesser marital fertility control or later *stopping* and shorter birth spacing. The decline resumed in the second half of the 1960s; it was much faster and more widespread among women of all ages over 20 years. This more recent decline seems to be the result of an earlier *stopping* of reproduction as well as a later *onset* of the first birth and more *spacing*.

Women in Rio de Janeiro started reproductive life later than in the other regions, either measured by age at first union or by age at first birth. The age at first birth was approximately stable until the 1970s and was postponed in the more recent period, 1980-86. More married women became mothers but transition rates for parities higher than one declined. The largest decline occurred in the progression to the third birth. Changes in transition rates were more marked than changes in timing, suggesting *limitation* of births rather than their *spacing* as a strategy for fertility reduction. However, the youngest cohort exhibited marked increases in the length of births intervals. This suggests that *spacing* was also a strategy used for the fertility decline, probably associated with the advanced stage of the demographic transition in Rio. This distinguishes Rio and São Paulo fertility patterns.

There are some indications that fertility started to decline in São Paulo at the beginning of the century. This phase seems to be determined by longer *spacing*, probably longer breastfeeding, and a reduction in the proportion of women who started motherhood. As in Rio de Janeiro, there are indications that a parity-related control fertility regime started there in the 1930s produced by a reduction of births of parity higher than two. Changes in the index of marital fertility control occurred at a higher speed in São Paulo than in Rio de Janeiro. Fertility growth was also seen in the 1950s but it was less marked than in Rio. It was also a result of an increase in fertility rates of women aged 25 and over who during this period seemed to *space* less and *stop* later. Fertility decline also resumed in the late 1960s in São Paulo but was less intense than in Rio de Janeiro. São Paulo fertility decline was more affected by the earlier *stopping* of reproductive life than the Rio decline.

More recent data pointed to an acceleration of the fertility decline in São Paulo during 1986-91. This was mainly due to a reduction in fertility rates of women aged 25-29 years suggesting an increase in the importance of *spacing*. Compared to Rio de Janeiro, changes in the *onset*, measured by age at first birth, did not contribute to this decline in São Paulo. Earlier marriage and an increase in pre-marital births and conceptions by teen age women resulted in an earlier first birth and also in a steady increase of the fertility of women aged 15-19 from 1970 to 1991.

The Northeast's reproductive pattern has been quite different from the two other areas. There was no evidence of fertility control there before the 1970s. Total fertility rates were approximately stable at around seven children until this time. Later starting and a high proportion of women who did not start motherhood prevented fertility from being even higher during this period. An increase in fertility was observed in the 1950s and 1960s among women aged 20 and over, probably as a consequence of an increase in nuptiality and shorter birth intervals. Fertility decline started in the 1970s and was strongly intensified in the 1980s mostly by women aged 25-34 years. The total fertility rate fell by 2.3 children between 1975 to 1991. Parity control fertility became apparent among women aged 45-49 in the 1991 DHS, suggesting a preference for families with two children. However, the total fertility rate was still high there in 1991 (3.8). This was 1.6 children higher than the Rio TFR in 1986.

The fertility decline that took place in the Northeast was the result of change in only one stage of the family formation process, the *stopping*. Changes in the *onset* of reproduction were in the same direction as in São Paulo; the first birth was brought forward as a result of earlier marriages and by an increase in pre-marital births and conceptions by teen age women. As in Rio, more married women became mothers. Northeastern women *spaced* less than those from other regions. For births of parities higher than one, birth intervals were on average six months shorter than in other regions.

Summarizing, fertility has been in movement in all three areas. This means fertility decline as well as fertility increase. The Northeast's experience seems to follow the pattern proposed by Dyson and Murphy (1985), that is, fertility growth preceding the decline. Since fertility started to fall there, the fall has been steady. Rio and São Paulo fertility increase after some decline contradicts one of the major tenets of demographic transition theory that is the irreversibility of the decline. Moreover, the fertility decline was not homogeneous. Women were indeed *stopping* earlier but teen-age fertility rose more married women became mothers. The understanding of these movements requires a more full view of the three phases of the process of family formation.

The use of the Bongaarts framework for measuring the components of fertility brought some insights to the understanding of the fertility movements. Contraceptive prevalence played the most important role in reducing fertility in all three areas and explained most of the regional differences. Sterilization was the most used contraceptive method in recent years. More recent changes in nuptiality, such as the increase in the late 1970s and early 1980s, operated in the direction of preventing further fertility decline. The other proximate determinants, breastfeeding and abortion, did not play a major role. Although these are the general trends, each regional history presents its own features.

Rio de Janeiro's fertility was mostly determined by factors other than marriage, contraception, breastfeeding, abortion or primary sterility, from the 1930s to the 1980s. The importance of these factors increased over time but not steadily. It was suggested that the increase in marital fertility observed from the late 1940s to the early 1960s was the result of an increase in effective fecundity, of lower primary sterility or intra-uterine deaths and also that fertility control was less practised there at that time. Lower nuptiality inhibited fertility rise in the late 1940s and its further growth in the following decade. A growth in the importance of factors other than nuptiality resumed in the late 1960s. They were responsible for the fertility decline. In this case, it was clear that " other factors" meant contraception. Nuptiality rose in the period and inhibited part of the effect of the increase in contraception.

Relatively high fertility rates in São Paulo in the past were due to higher nuptiality and, probably, to less fertility control and higher fecundity. The fertility decline which occurred was the result of factors other than nuptiality through an early *stopping* of childbearing. These factors inhibited the effect of nuptiality growth that took place during the 1930s on fertility. As in Rio, the importance of "other factors" declined in the 1950s and was responsible for the rise in fertility. The resumption of the fertility decline in São Paulo during the 1960s was the result of more contraception as it was in Rio. However, the strategies of contraception were regionally different in 1986. São Paulo women contracepted slightly more than in Rio but women started using contraception at an earlier stage of their reproductive cycle in Rio. There are some indications that the fertility differences between these two areas might be explained by differences in fecundity and by differences in reproductive strategies, especially in the *onset*.

Northeastern fertility was mainly inhibited by lower nuptiality and possibly by lower fecundity until the 1970s. There are indications that the fertility increase observed there in 1940-45 was a result of more nuptiality and that the following fertility growth in 1950-55 and 1960-65 were caused by lower primary sterility and intra-uterine mortality. The fertility decline that took place after the 1970s was an effect of a dramatic rise in contraception, mostly sterilization. This meant a quite early *stopping* of reproduction as in 1991 the median age at sterilization was 28.5 years. This generated a pattern of fertility change without other changes in the process of family formation. For instance, women were sterilized after a large number of children but they still married and had their first birth at a young age.

The thesis's findings suggest that although contraceptive prevalence is an important factor behind reduced fertility, other strategies should be taken into account, especially the history of contraception and the onset of reproductive life. For instance, at an early stage of fertility transition contraception is first used by women with high fertility without much change in others strategies of family formation. At an advanced stage, changes are spread through all phases of family formation. It was hypothesised that parity at starting contraception indicates the stages of fertility transition. Thus, women were classified as *planners*, if they started after the first birth and as *controllers* for women who began contraception after reaching the desired parity which is assumed to be two. Indications that fertility transition started through an early *stopping* of childbearing was found. Also, it was found that in 1986 sterilization was chosen by high fertility women who wanted to *control* their fertility. These women were also characterized by high levels of unwanted fertility.

Fertility transition advanced when women started to *plan* their families at an early stage of family formation. This effect was seen in all phases of the life cycle. Women who started contraception before the first birth had the first birth later, had fewer pre-marital births and conceptions, longer birth intervals, exhibited a lower transition rate to the third birth and were less likely to be sterilized. They also preferred a smaller family, around two children, had more chance of achieving it and consequently showed the lowest level of unwanted fertility. In this situation, *spacing* and later *onset* seemed to play an important role in bringing fertility down as well as early *stopping*. *Spacing* and later *onset* are the main of the pre-transitional fertility regime as stated by the theory of demographic transition.

The thesis also suggested that another characteristic of advanced transitions is the narrowing in the range of options for family size in a relatively short time. This was observed in fertility preferences as well as in fertility outcomes. Both the mean and the standard deviation of the distribution of women with complete fertility, aged 50-59, by observed parity declined dramatically in Rio and São Paulo between 1940 to 1980. This indicates a homogeneous reduction in the observed family size. In the Northeast, the same trend seemed to be emerging in the 1980s. Parity progression ratios and *quintum* values confirm this trend. They shown a large reduction in the progression to the third birth in all areas. It is likely that the third birth was a watershed between the new and old fertility regimes. This result was a combination of changes in preferences and attitudes. The reported desired mean family size and preference for the next birth pointed in the direction of a strong desire for a two children family.

The trend outlined above may lead to the acceptance of the existence of a couples *conscious choice* determining fertility behaviour. Nevertheless, the strong narrowing in the range of preferable and observed family sizes suggests that *social pressure* may have come before the *conscious choice*, contradicting Coale's first condition. It is assumed in this thesis that individual behaviour is grounded in culture and is a result of social norms, values, etc. It was observed that some institutions such as mass media, health services and the Church played a role in determining women's ideas about desired family size and more than that in legitimating and facilitating attitudes towards such preferences. They did not create their own values but spread values which in some way reflect belief and needs of a specific social group.

However, some component of fertility seemed to reflect individual preference as well. For instance, although the desired mean family size and preference for the next birth pointed in the direction of a strong desire for a two children family, some fluctuations in this preference were observed. A relatively high proportion of Northeastern women reported a willingness to not become mothers and in Rio some preference for a one child family was seen. The proportion of São Paulo women who reported a desire for three children is significant. Controlling by socio-economic variables suggested that the regional variations in the preference for the third birth were not explained by the regional differences in socio-economic conditions. The influence of specific (cultural) characteristics of the regions was much stronger on these preferences than were all the covariates. This makes it hard to think of a convergence in fertility levels and suggests a component of *couples' conscious choice* determining fertility behaviour or different *social* *pressure* in different areas. Summarizing, the strong preference for a two children family along with fluctuations suggests that fertility decline may reflect a contradictory combination *institutional pressure* and *couples' conscious choice*. Thus, it is difficult to identify how different the new behaviour has been from that observed in pre-transition times.

The first attempt to understand the fertility patterns delineated above and their regional differences was carried out by looking at the impact of childhood mortality decline on fertility trends. A *proxy* measure for net fertility was calculated and compared to gross fertility. High fertility matched with high mortality and low fertility with low mortality. As declines in gross fertility were more marked than they were for net fertility it seems reasonable to suggest that fertility decline was partially a response *(adjustment)* to mortality decline. As declines in net fertility were very important, this certainly expresses changes in the desired family size (*innovation*). The regional differences in fertility are narrower when net fertility measures are considered. However, the persistence of some differences also suggests differentiated preferences and attitudes towards family size. Again, the findings of this thesis point to a new fertility regime coexisting with some elements of the past.

The thesis findings do not show a clear and single association between socio-economic variables and family size. As all regions have such marked and different socio-economic and cultural features, each variable played a somewhat different role in the various areas and, consequently, in their reproductive behaviour. An important point is that the dramatic fertility decline observed in the three study areas was also a result of changes in the composition of the population by socio-economic group and even more so by the widespread decline among all these groups. This suggests a process of *diffusion* of the value of a small family and of the means of achieving it. Institutions such as the health services probably stimulated contraception by legitimating its use and facilitating specific arrangements between medical doctors and women. This made sterilization relatively cheap and the most widely used method. Exposure to mass media also affected contraceptive prevalence but this effect was regionally differentiated, again being more marked in the Northeast. A preference for sterilization among high fertility and less educated women was also seen.

Although family size preferences seemed to be well established, there were still some difficulties in translating these preferences into effective outcomes in all regions. A large proportion of unwanted fertility was found, especially in the Northeast. It was suggested that the bulk of the regional fertility differences between the Northeast and the two other areas was more to the implementation of women's fertility preferences than to differences in preferences themselves. This is expected in an intermediate stage of fertility transition. The lowest proportion of unwanted fertility was found in São Paulo. These women preferred a larger family than those in Rio and they had a higher prevalence rate. In this case, it is clear that the difference between fertility in Rio and São Paulo was a result of differences in preferences.

The process of *diffusion* confused the relationship between the socio-economic determinants of fertility and the intermediate variables. To some degree it even changed the direction of the differentials, as happened between sterilization and education. This allows the identification of two marked patterns of fertility changes in all three areas. In one, fertility decline was generated by sterilization but without other transformations in the process of family formation. The other pattern included transformations in all phases of the family formation process. The recognition of these two patterns makes it difficult to decide whether the fertility decline has been a result of the process of modernization or if fertility decline has been stimulated in order to bring about modernization. The *diffusion* of the small family size value by mass communication is, for instance, associated with the diffusion of modern values in general. This suggests that the fertility decline is part of the modernization of societies. It also suggests that demographic transition theory rather than <u>predict</u> a reduction in family size contributes to diffuse this ideal. In this case, it loses its status as a theory and becomes a guide for *diffusion* of the value of a small family.

The onset of reproduction played an important role in women's subsequent fertility, either measured by age at marriage or by age at first birth. This confirms the association described in the literature between early marriage, or motherhood, higher fertility and shorter birth intervals. It was also seen that women who started childbearing earlier had a greater chance of being sterilized. Although this was observed in all regions, the intensity of the effect was regionally differentiated. In Rio de Janeiro, later onset resulted in a much lower *quintum* and shorter birth intervals than in São Paulo and the Northeast. This is probably associated with the advanced stage of fertility transition observed in Rio. Women's social characteristics affected the onset of reproduction through the timing (women's age and the length of the first birth interval) and the amount of pre-marital births and conceptions. These characteristics also played an important role in the progression of births of high order, especially the third one, and consequently in final fertility rates.

The onset of contraception also seemed to be very important in determining family size and also in explaining the regional differences. Exposure to the mass media affected the likelihood of a woman becoming a *planner* in all regions. Highly exposed women had a much greater chance of becoming a *planner* than did other women in all regions. Attendance at church played an important role in Rio as well as did women's working status and the opinion of the religious leader in the Northeast. This may indicate some degree of secularization. Women's age and age at marriage were also important. The husband's occupation had some importance in São Paulo and the Northeast as did the place where women spent their childhood.. The impact of these variables was not enough to reduce the regional differences in this proportion.

The *stopping* of reproduction was analyzed through age at last birth and age at sterilization. Rio de Janeiro women experienced the earliest *stopping* of reproduction. The latest *stopping* pattern was found in the Northeast, 5.2 years later than Rio if age at last birth is used. As a result of their earlier start and later *stopping* of childbirth, Northeastern women spent more time in reproductive life. Since they also experienced shorter *spacing* patterns, their fertility was inevitably much higher. However, sterilization provoked a shortening of the reproductive span in all areas, especially in the Northeast, which also resulted in a reduction in the regional differences in *stopping*. In fact, the Northeast's median age at sterilization was, in 1991, 1.8 years lower than that observed for Rio in 1986.

Although fertility was declining among all observed groups, indications of a convergence of fertility rates were not found. The fertility differentials for the socio-economic variables considered here, residence, ethnic group, income, education and women's working status, either measured through period fertility rates or by transitions rates, *quintum*, were still quite important in 1986. It was also seen that the different social groups had different fertility preferences and different strategies of reproduction. However, motherhood was a general trend among married women in all three areas.

The regional fertility differences were not affected by differences in the socio-economic variables composition. In fact, this composition masked important differences in fertility. For instance, different residence composition hid important fertility differences between the urban areas and the contrary trend occurred in the differences between Rio and São Paulo rural areas. By the same token, migrants in destination areas narrowed the regional differentials, which in 1980-85 were basically a result of differences in fertility of the native borne population. Native Rio women had the lowest fertility among all women. Also, differences in ethnic composition contributed to a reduction in regional fertility differences. The regional differences in fertility would have been increased in the 1930s and 1940s if the ethnic composition was the same in the three areas. The largest impact would be in the difference between Rio's and São Paulo's fertility. Income composition played a very important role in the regional differences in total fertility rates. They would be narrowed strongly if these differences were eliminated, but there was still a component of fertility that was not explained by them. As income composition, education composition also played a very important role in regional differences in total fertility rates but not strong enough to eliminate them. Fertility differences by women's work status do not show any effect on regional differentials.

Indications of a continuation of fertility decline in the near future in all regions have been noted. Fertility rates may reach levels below replacement in Rio and São Paulo. However, indications of a convergence in fertility rates and of a stabilization in these rates at the replacement level were not found. Regional differences in total fertility rates were still marked in 1991-92 and these are likely to continue. Fertility preferences as well as strategies of contraception were regionally differentiated. Furthermore, the fertility outcome is more than a result of preferences and contraception. Non-planned events such as contraception failure, sterility, fetal wastage, longer conception waiting time, an undesired sex mix of children, divorce, widowhood or the death of one of the children are other factors that must also be taken into account. Also, new phenomen such as remarriages and AIDS should be incorporate in fertility analysis. Thus, it is difficult to think of an irreversible decline in fertility and the stabilization of fertility rates at some time. In other words, it is difficult to think of an end of the Brazilian fertility transition if the end is defined by low and stable fertility rates. Transition means movement and human behaviour is always in movement. In Fernando Pessoa's words, "to sail is precise. To live is not precise."

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