Interracial unions and fertility in Brazil: are there differences when couples are racially mixed?

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ABSTRACT

This paper investigates whether mixed race couples have different or same fertility level than same race couples, and whether there is an asymmetry on men's and women's race effect on fertility. Using Brazilian Census data for the year 2000 three explanations are considered:1) adaptation either through assimilation or innovation; 2) resistance or rupture and 3) selectivity. The results support the independent effect of race in fertility and its explanation through innovation. The interracial couples pass through an adaptation process and have fertility in between their racial groups. Both, men's and women's race have similar weight in the couple's outcome (about 50% each). Considering the potential asymmetry between them, the results show that the darker partner has a slightly lower power on fertility after controlling for women's education. Furthermore, the findings also contribute to the discussion about the importance of considering men's characteristics, besides their income, in reproductive behavior studies.

Key words: Interracial unions, race, fertility, and Brazil.

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1. INTRODUCTION

The fertility difference between whites and nonwhites in Brazil is largely known. In 2000 white women had on average 2.05 children, brown women 2.75, and black women 2.80 children (IBGE 2000). There is also an important literature that addresses racial differences between whites and non-whites in health services access (Perpétuo 2002, 2006; Simão et al 2004) and reproductive behavior, including timing to marriage and childbearing (Bercovich 1991; Simão et al 2006; Miranda-Ribeiro et al 2008). The race effect in fertility is widely discussed as a product of socioeconomic characteristics (i.e. Lee 1952 1959; Lunde 1965).

Higher levels of fertility among minorities are interpreted as a temporary phenomenon, because as soon as they assimilate to the social and economic characteristics of the majority population, their fertility level will converge to that of the white population. However, not all racial difference is eliminated after controlling for socioeconomic characteristics, so some authors claim that part of the explanation for fertility racial differential is understood as a race independent effect. The first formulation of this hypothesis was called the minority group status hypothesis by Goldscheider and Uhlenberg (1969). The independent influence of race, in this approach, is interpreted as a consequence of structural norms, in which nonwhites face more difficulty to attain upward social mobility and when they have this opportunity, they depress fertility in order to achieve their objectives (Goldscheider and Uhlenberg 1969, Sly 1970, Kennedy 1973,) or because of subculture norms, in other words, there are specific racial/ethnic norms and values that shape fertility outcomes (Lopez and Sabagh 1978, Sorenson 1985). These explanations are often presented as contradictories but it is unclear how they operate in order to influence fertility.

Bercovich (1982) shows that the Brazilian case is a little different, because black women until end of 1960s had lower fertility than brown and white women, the crossover happened because white women fertility dropped faster and earlier than among black women. She also highlight that differences between more educated women and low educated women are bigger among black women. A more recent work from Miranda, Ortega, and Rios-Neto (2006) used Kohler and Ortega (2002) approach of tempo, quantum, and parity and show that the fertility decline among white women started much earlier than among nonwhites. Between 1987 and 2000, there was a decrease of the tempo effect for whites and nonwhites (the authors did not separate black and brown women). The parity effect is small among white and big among blacks and browns, which is an evidence of difference in timing of fertility decline. The adjusted total fertility rate shows a convergence and if there were no change in the mean age at childbearing and in the fertility composition by parity the fertility differential would be tiny and almost zero by race.

Another point is the fact that in Brazil the racial groups are not clearly defined as in the United States; the brown category hides a variety of skin color. Since slavery, level of darkness is something considered in the marriage market. The negative pressures were weaker among marriages between mixed race spouses from lower economic status, because they would have similar conditions, except in the case that one of them (especially the woman) were "completely black". In this context, mixed marriage mostly happened for economic reasons, for whitening or in case of not finding a spouse among one's social circle (Samara 1989:41-42).

Family formation in Brazil was mainly influenced by the patriarchal system that has the nuclear family as its role model, even among slaves this model was encouraged, especially by the Church. The main idea is to have the men as the breadwinner and the wife who takes care of the household and children, therefore this model is characterized by the sexual division of labor. Great differences in fertility was mainly due to the rural conditions of subsistence production that encourages higher fertility (Durham 1982).

The importance of studying the relationship between race, marriage and fertility is also due to the fact that fertility is a behavior that represent social norms. Marriage represents a life cycle transition that, along with other elements, marks the passage from youth to adulthood, the decision with whom to marry is influenced by previous socialization that might be summarized in one's preference for spouse's characteristics, and opportunities and constraints in the marriage market (i.e sex ratio). Finally, intermarriage also means transformation or it is at least a type of relationship that is not the most common, therefore, the selectivity explanation for having a different behavior, such as number of children, is quite strong. However, how much and how they adopt a different conduct need to be explore.

The Brazilian particularities in terms of race and family formation, that are different from the United States claim for a different approach about racial differences in fertility. Even with many studies about race and fertility, little is known about the fertility behavior of multiracial couples. Does the fertility level follow the minority trend or the majority trend? Is it higher or lower than same race couples? Is the men's race important? Is there an asymmetry in how women's and men's race effect fertility? The study of fertility behavior of mixed race couples comprises two important theoretical discussions.

This work approaches three possible explanations. First , the adaptation process, which states that after marrying the spouses pass through a process of adaptation that includes negotiation of preferences. It might be a complete assimilation from one's point of view, for instance, the black would adopt the white behavior or vice versa, or the adaptation process would produce a specific behavior, resulted from both races, we are calling this process as innovation. The second explanation is the rupture, a white woman married with a brown man would interrupt her fertility preferences in face of her spouse's diverging preferences. The third framework is about selectivity, women and men who choose to marry heterogamously might have fertility preferences different from their own racial group or at least similar to each others. The selectivity might be in the fact that these individuals are more open to negotiate their differences. These hypothesis are not necessarily mutually exclusive they can be seen as complementary, and might be related to duration of marriage (Goldstein and Goldstein 1981).

Another point of discussion is the importance of considering men's characteristics in fertility studies. Fertility is usually treated as a function of women's characteristics, such as age, education, and race, even when the study object is marital fertility. The men's characteristic that is more frequently incorporated in the analysis is their income, and mostly as a socioeconomic household measure. In these studies, their influence is restricted to the economic aspect of fertility behavior. However, fertility outcomes or decisions are made by couples, and that is why it is important to consider other men's characteristics. It is also reasonable to think that men can influence women's decisions through other mechanisms, which can be analyzed by other variables such as age, education and race (see Sorenson 1989). Men also might have their own preferences about how many children they want to raise.

Considering fertility level as a result of a couple's decision does not mean that both spouses have the same involvement in the decision making process. In some cultures women do not have enough independence to decide about their own reproductive health; in other places men do not take a big role in this process. Again, it is reasonable to think that men's characteristics are important in the fertility decision making process (Mason and Taj 1987;

Mason and Smith 2000; Gipson and Hindin 2009). In this paper, besides men's income, their race is included in the analysis in order to better understand the relationship between race and fertility.

Using Brazilian Census data for the year 2000, this paper investigates the fertility level for same and different race couples and the role of men's and women's race in the couples' number of children using Poisson and Diagonal Models.

2. METHODOLOGICAL APPROACH

Data

The data is from the Brazilian Census of 2000 (5% sample), accessed through IPUMS (Minnesota Population Center 2009). Census Data is appropriate to study interracial marriage because although interracial marriage is common in Brazil, is not common for all groups. The large number of cases in the Census allows for the study of these smaller groups. Moreover, the Census includes data for the whole country and not just some areas, as in some Household Surveys. This is very important because the interracial marriage phenomenon is not distributed equally across the country. And unlike fertility specific surveys (i.e. Brazilian DHS, PNDS) the Census has information about spouses/partners.

Study Object

The analyzed group is married or cohabiting couples, in which the women are between 20 and 34 years old in Brazil in 2000. This age range intends to capture people who are in their first marriage, as used by Fu (2008) and Ribeiro (2008) and justified by Mare (1991) who indicates that the marriage pattern of the first and second marriage is different. This is a very strong assumption and it would be better to have data about marriage history, but this data is not available in the data. This restriction is also important for studying the relationship between fertility and marriage. Because the data do not have information about parenthood for each child and the number of ever born is answered by the women[3], the assumption is that the spouse at the time of the survey is the father of all children ever born by that specific woman. The color categories that are considered are: black, brown, and white, as already defined.

Variables

- Dependent variable: number of children ever born per married or cohabiting couple, in which the women are between 20 and 34 years old.

Independent Variable: Racial composition of marriage couples, considering each spouse's race. There are nine groups combining whites, blacks, and browns by gender. So, white husband and black wife, and white wife and black husband are two different couples. In this paper, we also propose an answer for the question with whom to compare the minority group. Instead of comparing the mixed race couples to the white couples, we also compare them to the black and brown couples. But differently from Kennedy (1973) blacks and browns in the context of same race or mixed race marriages are considered minorities, and we are not interested his numerical approach. Marriage arrangement (same or different race coups) has the same limitation of Kennedy's work: "statistical data on the group in different settings may not be

[3] In 2002, the mean age at divorce for men was 37.7 years old and for women 35, therefore unions within this age rage seems to be first marriage (Source: IBGE - http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=132&id_pagina=1) Another important information is the mean age at childbearing. In 2000, it was 26.4 for white women , 26.1 for brown and 26.6 for black women, so it does not vary among race and it is about the middle of the age interval analyzed (IBGE 2000), so fertility differences among racial groups do not seem to be due to childbearing timing.

sufficiently comparable, and what appears to be the same group living under different conditions may, in fact, be fundamentally different groups" (87). In the case of exogenous marriage, there might exist a selective process in the formation of mixed race couples, and this process might be not capture by statistical variables and can be fertility associated factors.

- Control Variables:
  - Women's education: discrete variable from 0 to 17 years.
  - Men's income divided in five categories: no income (reference), 1st quartile, 2nd, 3rd and 4th quartiles
  - Women's age: categorical variable – 20-24; 25-29; and 30-34 (reference).
  - Racial composition of the state where the couple lives: percentage of white people by state.
  - Urban/Rural area: dummy variable, one equals urban and zero equals rural.
  - Cohabiting: dummy variable, one equals to cohabiting couples

Statistical Approach

Poisson regression was used to analyze whether there is differences in fertility level between couples of the same color and mixed race couples. Poisson models are used when mean and variance are equal, but for fertility variance is a little higher, so we tested Negative Binomial Models and the results were the same.

For testing answering the second question, which accounts for possible differences between men's and women's race effect on fertility, we used the Diagonal Reference Model formulated by Sobel (1981 1985). The diagonal reference model is appropriate to study partner effects in fertility decision process when the couple is the unit of analysis and an independent variable is asymmetric for women and men in a specific outcome (i.e.fertility). Originally the Diagonal Model was formulated for estimating the separate effect of father's occupation, individual's occupation, and the discrepancies between them (social mobility). Sorenson (1989) analyzed the effect of women's and men's education attainment in fertility in United States. Other applications are: Sorenson and Brownfield (1991) analysis of mother's and father's characteristics on delinquency; Clifford and Heath (1993) tested the effect of social mobility on voting behavior; Van der Sirk et al (2002) work on the effects of both parents' educational levels on their child-rearing values conformity; and Vaisey's (2009) paper on poor/non poor aspirations and ideals effect on educational attainment.

The basic argument behind the model is that within racially homogamous couples, the race of one's spouse cannot have an additional effect on one's own fertility. Therefore the same race couples are considered as the reference for the mixed race couples. Race influence in fertility for white men and brown women, for instance, is calculated as a function of the fertility of white couples and brown couples. If the outcome resembles more the white couple men, in this example, has the largest weight.

The model is characterized by i) the weights for men (1-p) and for women (p) are constrained to sum to one and ii) the coefficients calculated for homogenous couples should sum to zero, and they are considered equal for both men and women. The model specification is (Sobel 1985):

$$Y_{ijk} = (p).(race\_w_i) + (1-p).(race\_m_j) + \sum \beta X_{ijk|} + e_{ijk}$$

where i= women's race

j=men's race

p=weight (0≥w≤1)

k=1 to 702545(total sample)

| = number of control variables

e= error term

The main advantages for using the Diagonal Reference Model are: 1) the weight parameter allows a clear one-parameter test of the relative strength of two matched categorical variables; 2) the estimation of single coefficients for each value of the matched variables makes these variables much more interpretable in the context of substantial collinearity between the matched variables (spouses race might be correlated, and it makes it hard to separate their race effect on fertility) ;and 3) the Diagonal Reference Model is more parsimonious than conventional models , like the Poisson in which there are eight coefficients to be interpreted

This analysis aims to provide evidence for how each spouse's race contributes to the final number of children. First, the weights for lighter men (1-p) and women (p) will indicate whether there are any different effects of each partner race on the fertility level. If p=0.5, it means that they have the same predictive weight, whereas if p=1, then men's race has no independent effect. The second interest is to analyze whether being lighter or darker change the race effect, in other words, the relative effect of men's race in fertility is weaker or stronger if he is darker than his spouse. In order to answer this question the model presents an interaction effect on the weight-factor. Table 1 and Table 2 present the hypotheses and how they are tested.

3. RESULTS

Descriptive Analysis

The total sample is 702,545 couples married or cohabiting in which women were between 20 to 34 years old. The women's racial distribution is 55.42% white; 5.53% black; and 39.06% brown. Among men, 52.85% whites; 6.93% blacks; and 40.22% browns. Most of the couples are white-white couples (40.14%); followed by brown-brown couples (26.37%). About 31% of the total couples are interracial. The largest group among them is brown and white spouses which account for 76.6% of the total interracial relationships, the smallest groups are black women and white men (1.58%) and black women and brown men (1.37%) (see Table 1A).

The average number of children ever born is 1.97 (ranging from 1.64 for white couples and 2.38 for black couples). Women's age is on average 27.50 years; 28% of women were between 20 and 24 years; 35% between 25 and 29, and 37% in the age interval 30-34 years old. Women's mean education was 6.61 years (ranging from 7.81 among white women and 5.17 black). Among mixed couples women had higher education on average than women in black and brown couples. Men's education was on average 6.15 years (just a little bit lower than women, and ranges from 7.51 among white men and 4.55 among blacks). And men's education among mixed race couples was also higher than black and brown. One explanation is a great proportion of white men and white women among mixed race couples. The same trend is observed for income. Most couples are formally married and 36% are cohabitating (25% among white couples and 49% of black couples) (Table 2A).

Same race couples have on average 1.93 children while mixed couples have 2.05 children. Same race couples have lower fertility because the majority of those couples are white. This data shows that homo and heterogamous unions do not have the same fertility level. When the man is lighter the fertility level is slightly higher: 2.07 children versus 1.95 when the man is darker. If the man is lighter it means that the woman is darker, since darker woman tends to have higher fertility level this evidence of interracial marriage seems to follow the general pattern of the relationship between women's color and fertility. Moreover, it indicates that even in face of lower racial identity (less racial integration) black and brown women seemed to push fertility up, as predicted by the subculture approach.

Table 3A shows that the lowest fertility is among white couples (1.64 children ever born) and the highest among black couples (2.38). Brown couples have on average 2.33 children. Mixed race couples have fertility levels that fall in between same race couples; not as high as black or brown couples but not as low as the white couple. This pattern is the same when analyzing the average number of children ever born to women with at least high school education (Table 4A) or for women and men with at least high school (Table 5A). The fact that the fertility level of mixed race couples is in between indicates that these couples have their own sexual and reproductive characteristics.

The distribution of children ever born is presented in figure 1A, but the differences are clearer in figure 2A in which there is the density of couples by one, two, three and four or more children. 58.78% of all couples have one or two children. Most white couples have only one child (33.66%), whereas most of the brown, black and mixed couples have two children. The main differences are on the extremes: among who are 0 and 4 or more children. Childless brown couples are only 9.74% of the population whereas white couples without children represent 16.20%. Only 6.3% of white couples have four or more children, whereas about a fifth of black couples have as many children. Among mixed couples 13.17% have four or more children, which is a much lower percentage than black and brown couples that have four or more children, but it corresponds to the double of white couples.

Poisson Regression Results

Tables 4A and 5A present the results for the Poisson Regressions, which have the objective to compare the fertility level of mixed race couples and same race couples. The first set of models has the nine couples's from the three color (brown, black, and white) combinations and the white couple is the reference group (Table 4A). In the second we compiled all mixed race couples and use them as the reference group (Table 5A).

For each analysis there are five models with the same control variables. The first one has only the couples as independent variables. Women's age is added to the second, women's education is added in the third equation. Men's income divided in five groups are added in the fourth model, other control variables, such as, region of residence, cohabitation, and race distribution of the state are in the fifth model.

The results show that all couples (black, brown and mixed race) have higher fertility level than white couples. The bigger coefficients are among brown and brown couples and black couples. Even controlling for demographic and socioeconomic characteristics the difference remains, but much smaller coefficients, about one-third of the coefficients of model one (that includes only the couples as independent variables). This result shows that a great part of the difference in fertility level is due to unequal characteristics between groups and that some difference still remains and might be better understood using a different approach, or the adaptation process in the case of mixed couples.

The remaining difference between mixed race couples and white couples ranges from 0.065 (brown men and white women) to 0.121 (black men and brown women). The results are as to mixed whether mixed race couples have higher or lower fertility than black and brown couples. For instance, black and brown couples have higher coefficients (Model 5 - 0.106 and

0.121) than black and brown couples, but white and brown couples (0.065 and 0.070) have lower. Therefore, it is hard to make a generalized statement about mixed race couples without considering with whom to compare them. Thus, following the working hypotheses that consider marriage as a context to analyze integration (or racial identification); we should compare them to blacks and brown couples (the more integrated ones). Blacks and browns married to whites have lower fertility than black and brown couples, which supports the structural explanation. Comparing white women and brown men couple with white men and brown women the coefficients are very similar. In this case, the results can be interpreted regardless sex. This is going to be better discussed in the next subsection. Analyzing the black/white couples, we find that white women and black men couples have higher fertility than white men and black women couples. The same result is observed for black/brown couples, for black men and brown women the fertility level is a little higher than for brown men and black women.. In the next subsection we explore the role of each partner in the fertility level.

It is worth highlighting two results about the control variables. First, in model five, the lower level of men's income is not statistically significant different from not having income. This is interesting evidence that men's income may not have a negative relationship with fertility among poor people. Second, cohabitation has a positive relationship with number of children ever born by women between 20 and 34 years old.

Diagonal Reference Model Results

Table 7A presents the results for the Diagonal Reference Model, there are five models. The first one only considers the race of each partner and estimates its weights. From the second to the fifth models control variables are added.

From model one to model five we can see that even controlling for socioeconomic variables (women's education and men's income) and women's age the difference among fertility for different groups still remains, as in the Poisson Models. The constants show that white have a lower fertility level than browns and blacks in general, since there is no distinction between men's and women's race, the constants represent the baseline for each race. The weights show that both women's and men's color have very similar weights, about 50%. Women's weight is a little higher 0.519 than men's 0.481 (model 5). The weights results only apply to mixed race couples (not to the diagonal of the table).The results show that mixed race couples have in between fertility, in other words, not as low as white and not as high as brown and blacks. Another importance of this result: men's characteristics also matter for fertility studies.

Table 7A presents the results for the analysis when the men are darker than the women and vice-versa the objective is to analyze more closely the weight (role) of each partner's race and disentangle the structural and subculture explanations. When considering the couple's racial composition the results show that controlling for education makes an important difference. The models that do not include women's education (models one, two, and four) show that in mixed race couples in which the men are lighter than the women, women's weight is higher than men's. In this case, darker women have a stronger effect in fertility than her lighter partner. This result follows the general pattern of women's fertility. However, adding women's education in the equation the result is opposite; the darker partner has a weaker contribution to the final fertility level.

4. DISCUSSION AND CONCLUSIONS

The results corroborate the hypothesis that race has an independent effect on fertility, meaning that even controlling for socio economic conditions there is still a small but significative difference among the couples. Not only race, but also the type of marriage matters in the number of children. Interracial couples have, on average, in between fertility from their racial groups, regardless which is the combination (brown and white, white and black, or brown and black). This seems to result from an adaptation process, in which there is an innovation in the couple's behavior. Therefore, there is not a complete assimilation of the partner's fertility preference, neither a complete rupture of one's preference. The hypothesis of rupture is very important in this context because given the age range analyzed most marriages are recent unions. Rupture tends to be at the beginning of the transition (i.e. migration, marriage). The weights of each spouse race, calculated in the Diagonal Model, are roughly 50% each, which is also an indicator of adaption through innovation and not complete assimilation.

The finding that mixed race couples have their own fertility behavior is quite important for the future of fertility and the racial configuration of the country. Studies about the convergence of fertility level among different groups might need to consider not only the woman's characteristics but also her spouse's. Moreover, the creation of a different pattern other than the white might have implication for the race distribution in the future, all mixed race couples have usually brown or black kids, although other factors, such as education and income, influence in children's race classification (Schwartzman 2007).

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APPENDIX

Table 1A – Distribution of Couples, Brazil, 2000

Couples	N	%
White Couple	282,032	40.14
Black Couple	17,867	2.54
Brown Couple	185,232	26.37
White Women & Black Men	14,871	2.12
White Women & Brown Men	90,195	12.84
Black Women & White Men	11,106	1.58
Black Women & Brown Men	9,647	1.37
Brown Women& White Men	76,341	10.87
Brown Women & Black Men	15,254	2.17
Total	**702,545**	**100**

Data Source: Brazilian Census, 2000.

Table 2A – Mean and Standard Deviation of Selected Variables, Brazil, 2000

Variables	Total		White Couple		Black Couple		Brown Couple		Mixed Couple	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
CEB	1.97	1.48	1.64	1.23	2.38	1.74	2.33	1.67	2.05	1.50
White Couples	0.40									
Black Couples	0.03									
Brown Couples	0.26									
Mixed Couples	0.31									
Couples that men is lighter	0.14									
Women's Age	27.50	4.19	27.75	4.14	27.58	4.20	27.29	4.22	27.34	4.20
Women 20 -24	0.28		0.26		0.28		0.30		0.29	
Women 25-29	0.35		0.35		0.34		0.35		0.35	
Women 30-34	0.37		0.39		0.38		0.35		0.35	
Women's education	6.61	3.89	7.81	3.92	5.17	3.62	5.38	3.57	6.23	3.67
Women's in the labor force	0.41		0.47		0.38		0.34		0.38	
Men's Education	6.15	4.06	7.51	4.10	4.55	3.62	4.73	3.64	5.73	3.81
Men's Income (log)	5.12	2.65	5.72	2.34	4.44	2.83	4.48	2.84	4.94	2.68
Cohabiting	0.36		0.25		0.49		0.45		0.41	
Urban	0.76		0.79		0.71		0.70		0.77	
Whites in the state	54.08	19.89	64.89	17.90	48.37	19.37	42.72	16.35	50.19	18.02
Men’s with no income	0.10									
Men’s income in the first quartile	0.24									
Men’s income in the second quartile	0.21									
Men’s income in the third quartile	0.22									
Men’s income in the fourth quartile	0.22									

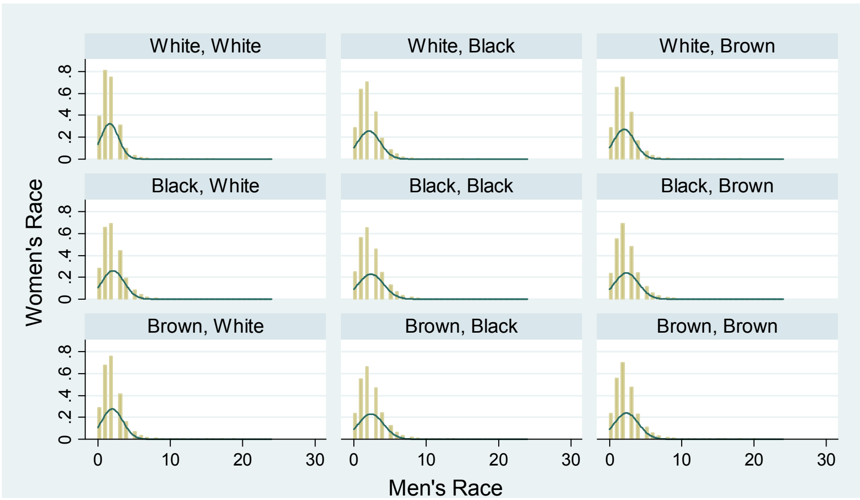
Data Source: Brazilian Census, 2000.

Table 3A – Average of Children Ever Born by Men’s and Women’s Race, Brazil, 2000

			Women's Race			
			White	Black	Brown	Total
Men's Race	White	Mean	**1.64**	**2.11**	**2.02**	**1.73**
		Std.Dev	-1.23	-1.55	-1.46	-1.30
		N	282032	11106	76341	369479
	Black	Mean	**2.09**	**2.38**	**2.34**	**2.28**
		Std.Dev	-1.53	-2.38	-2.34	-2.28
		N	14871	17867	15254	47992
	Brown	Mean	**1.99**	**2.39**	**2.33**	**2.23**
		Std.Dev	-1.44	-1.72	-1.67	-1.61
		N	90195	9647	185232	285074
	Total	Mean	**1.73**	**2.30**	**2.25**	**1.97**
		Std.Dev	-1.31	-1.69	-1.62	-1.48
		N	387098	38620	276827	702545

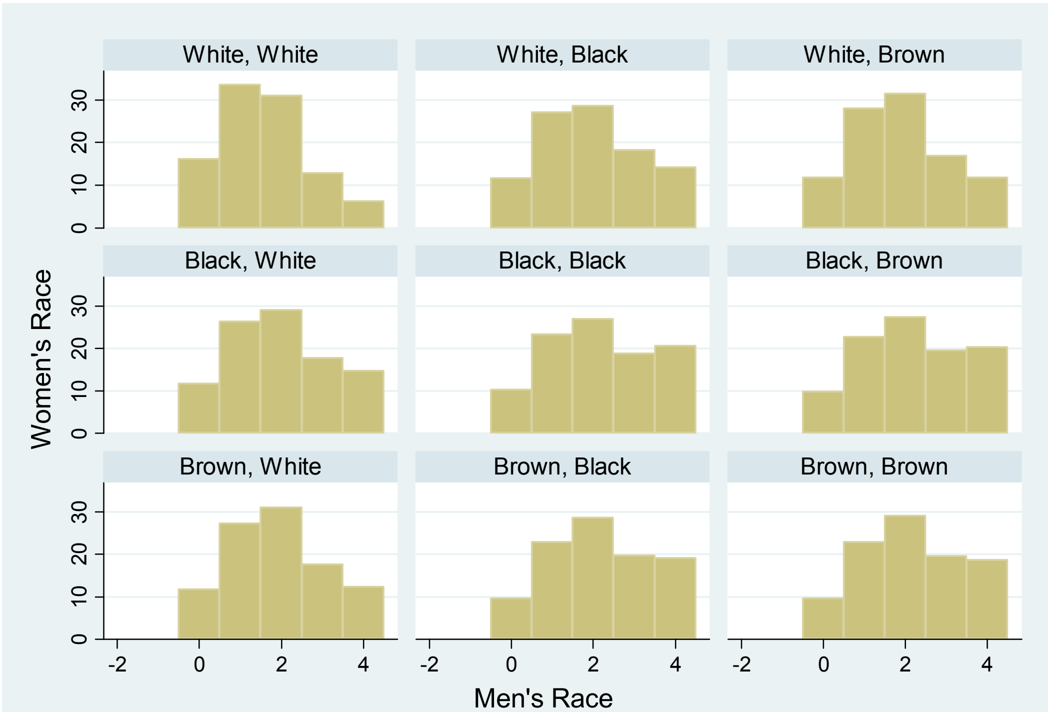
Data Source: Brazilian Census, 2000.

Figure 1A – Distribution of Number of Children Ever Born by Men's and Women's Race, Brazil, 2000



Data Source: Brazilian Census, 2000.

Figure 2A – Distribution of Number of Children Ever Born (truncated in 4 or more children) by Men's and Women's Race, Brazil, 2000



Data Source: Brazilian Census, 2000.

Table 4A – Poisson Results for Brazil, 2000

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Black Men & White Women	0.245*	0.271*	0.139*	0.125*	0.091*
	(.006)	(.006)	(.006)	(.006)	(.006)
Brown Men & White Women	0.195*	0.215*	0.117*	0.104*	0.065*
	(.003)	(.003)	(.003)	(.003)	(.003)
White Men & Black Women	0.253*	0.274*	0.128*	0.111*	0.076*
	(.007)	(.007)	(.007)	(.007)	(.007)
Black Couple	0.375*	0.384*	0.191*	0.165*	0.115*
	(.005)	(.005)	(.005)	(.005)	(.005)
Brown Men & Black Women	0.380*	0.396*	0.196*	0.168*	0.106*
	(.007)	(.007)	(.007)	(.007)	(.007)
White Men & Brown Women	0.211*	0.229*	0.125*	0.113*	0.070*
	(.003)	(.003)	(.003)	(.003)	(.003)
Black Men & Brown Women	0.360*	0.382*	0.205*	0.182*	0.121*
	(.005)	(.005)	(.006)	(.006)	(.006)
Brown Couple	0.356*	0.378*	0.200*	0.174*	0.110*
	(.002)	(.002)	(.002)	(.002)	(.002)
Women 20 to 24 years		-0.568*	-0.557*	-0.568*	-0.586*
		(.002)	(.002)	(.002)	(.002)
Women 25 to 29 years		-0.244*	-0.229*	-0.232*	-0.240*
		(.002)	(.002)	(.002)	(.002)
Women's education			-0.075*	-0.069*	-0.065*
			(.0002)	(.0003)	(.0003)
Men's inc - 4th quartil				-0.133*	-0.090*
				(.003)	(.003)
Men's inc - 3rd quartil				-0.130*	-0.086*
				(.003)	(.003)
Men's inc- 2nd quartil				-0.093*	-0.064*
				(.003)	(.003)
Men's inc - 1st quartil				0.007**	-0.002
				(.003)	(.003)
Race distrib. By state					-0.003*
					(.0001)
Urban					-0.071*
					(.002)
Cohabiting					0.068*
					(.002)
Constant	0.492*	0.700*	1.236*	1.288*	1.469*
	(.001)	(.002)	(.002)	(.003)	(.004)
R adjusted	0.0135	0.0411	0.0841	0.0859	0.0885
Goodness-of-fit (chi2)	782092	715648.6	612287.5	608072.2	601771
d.f.	702536	702534	702533	702529	702526
N	702545	702545	702545	702545	702545

Data Source: Brazilian Census, 2000.
Note: * significative at 1%; ** at 5%; and *** at 10%.

Table 6A – Poisson Results for Brazil, 2000

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Black Couple	0.147*	0.136*	0.058*	0.046*	0.039*
	(.005)	(.005)	(.005)	(.005)	(.005)
Brown Couple	0.127*	0.130*	0.067*	0.056*	0.034*
	(.002)	(.002)	(.002)	(.002)	(.002)
White Couple	-0.228*	-0.248*	-0.132*	-0.117*	-0.075*
	(.002)	(.002)	(.002)	(.002)	(.002)
Women 20 to 24 years		-0.568*	-0.557*	-0.568*	-0.586*
		(.002)	(.002)	(.002)	(.002)
Women 25 to 29 years		-0.244*	-0.229*	-0.232*	-0.240*
		(.002)	(.002)	(.002)	(.002)
Women's education			-0.075*	-0.069*	-0.065*
			(.0002)	(.0003)	(.0003)
Men's inc - 4th quartil				-0.134*	-0.090*
				(.003)	(.003)
Men's inc - 3rd quartil				-0.131*	-0.086*
				(.003)	(.003)
Men's inc- 2nd quartil				-0.093*	-0.064*
				(.003)	(.003)
Men's inc - 1st quartil				0.007**	-0.002
				(.003)	(.003)
Race distrib. By state					-0.003*
					(.0001)
Urban					-0.071*
					(.002)
Cohabiting					0.069*
					(.002)
Constant	0.720*	0.948*	1.370*	1.407*	1.546*
	(.001)	(.002)	(.002)	(.003)	(.004)
R adjusted	0.013	0.041	0.084	0.086	0.088
Goodness-of-fit (chi2)	783456	717025	612616	608317	601897
d.f.	702541	702539	702538	702534	702531
N	702545	702545	702545	702545	702545

Data Source: Brazilian Census, 2000.
Note: * significative at 1%; ** at 5%; and *** at 10%.

Table 7A – Diagonal Reference Model Results, Brazil 2000

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
White	-0.494*	-0.498*	-0.222*	-0.328*	-0.190*
	(.004)	(.004)	(.004)	(.003)	(.002)
Black	0.289*	0.289*	0.119*	0.189*	0.101*
	(.007)	(.006)	(.006)	(.006)	(.002)
Brown	0.204*	0.210*	0.103*	0.140*	0.089*
	(.004)	(.004)	(.004)	(.004)	(.004)
weight (women)	0.517*	0.513*	0.518*	0.516*	0.519*
	(.005)	(.004)	(.009)	(.006)	
weight (men)	0.483*	0.487*	0.482*	0.484*	0.481*
	(.005)	(.004)	(.009)	(.006)	
Women 20 to 24 years		-1.038*	-0.976*	-1.081*	-0.992*
		(.004)	(.003)	(.004)	(.003)
Women 25 to 29 years		-0.520*	-0.506*	-0.531*	-0.508*
		(.004)	(.004)	(.004)	(.003)
Women's education			-0.124*		-0.116*
			(.0003)		(.0003)
Men's inc - 4th quartil				-0.739*	-0.226*
				(.007)	(.006)
Men's inc - 3rd quartil				-0.490*	-0.230*
				(.007)	(.006)
Men's inc- 2nd quartil				-0.296*	-0.194*
				(.007)	(.006)
Men's inc - 1st quartil				0.117*	0.041*
				(.007)	(.006)
Constant	2.135*	2.608*	3.310*	2.876*	3.384*
	(.003)	(.004)	(.004)	(.007)	(.006)
Log pseudolikelihood	-1185433.7	-1153039.2	-1102782.2	-1135711	-1100729.6
N	702545	702545	702545	702545	702545

Weights	Model 1	Model 2	Model 3	Model 4	Model 5
Women	0.517*	0.513*	0.518*	0.516*	0.519*
Men	0.483*	0.487*	0.482*	0.484*	0.481*

Data Source: Brazilian Census, 2000.

Note: * significative at 1%; ** at 5%; and *** at 10%.

Table 8A– Diagonal Reference Model with interaction effect between race and being lighter/darker results – Brazil, 2000

Variables	Model1	Model2	Model3	Model4	Model5
White	-0.490*	-0.493*	-0.223	-0.325	-0.191
	(.004)	(.003)	(.004)	(.003)	(.002)
Black	0.287*	0.285	0.119	0.187	0.101
	(.006)	(.006)	(.006)	(.006)	(.002)
Brown	0.204*	0.208	0.104	0.138	0.089
	(.004)	(.004)	(.004)	(.004)	(.004)
weight (women)	0.479*	0.457*	0.546*	0.460*	0.536
	(.007)	(.006)	(.021)	(.009)	
			-		-
menlighter	0.084*	0.122*	0.061**	0.121*	0.038**
	(.011)	(.01)	(.027)	(.015)	(.015)
weight (men)	0.521*	0.543*	0.454*	0.540*	0.464
	(.007)	(.006)	(.021)	(.009)	
menlighter	-0.084*	-0.122*	0.061**	-0.121*	0.038**
	(.011)	(.01)	(.027)	(.015)	(.015)
Women 20 to 24 years		-1.039*	-0.976*	-1.081*	-0.992*
		(.004)	(.003)	(.004)	(.003)
Women 25 to 29 years		-0.520*	-0.506*	-0.531*	-0.507*
		(.004)	(.004)	(.004)	(.003)
Women's education			-0.124*		-0.116*
			(.0003)		(.0003)
Men's inc - 4th quartil				-0.738*	-0.226*
				(.007)	(.006)
Men's inc - 3rd quartil				-0.490*	-0.230*
				(.007)	(.006)
Men's inc- 2nd quartil				-0.296*	-0.194*
				(.007)	(.006)
Men's inc - 1st quartil				0.117*	0.041*
				(.007)	(.006)
Constant	2.125*	2.594*	3.314*	2.867*	3.386*
	(.004)	(.004)	(.004)	(.007)	
	-	-	-	-	-
Log pseudolikelihood	1185404	1152972	1102778	1135681	1100729
N	702545	702545	702545	702545	702545

Men lighter=1 - it means that men is lighter and women darker					
Weights	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Women	0.562*	0.578*	0.485**	0.581*	0.499**
Men	0.438*	0.422*	0.515**	0.419*	0.501**

Men lighter =0 it means that men is darker and women lighter					
Weights	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Women	0.479*	0.457*	0.546**	0.460*	0.536**
Men	0.521*	0.543*	0.454**	0.540*	0.464**

Data Source: Brazilian Census, 2000.

Note: * significative at 1%; ** at 5%; and *** at 10%.