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Discrepant Fertility in Brazil: an analysis of women who have fewer children than desired (1996 and 2006)

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Abstract

Two distinct groups with respect to realization of reproductive preferences coexist in Brazil: women who have more children than they would like and women whose reproductive period result in fewer children than they thought ideal. There is discrepant fertility in both cases. This study aims to enhance knowledge about this phenomenon by analyzing the discrepant fertility according to socio-demographic variables, especially for women who have fewer children than they desire and thus have a negative discrepant fertility (NDF). This study uses data from the National Demographic and Health Surveys for Women and Children from 1996 and 2006. The results show an increasing trend

Resumo

O Brasil convive com dois grupos distintos no que diz respeito à realização das preferências reprodutivas: por um lado, mulheres que ainda têm mais filhos do que gostariam e, por outro, mulheres terminando o período reprodutivo com menos filhos do que o declarado ideal. A fim de intensificar os conhecimentos a respeito deste fenômeno, este trabalho analisa a fecundidade discrepante (FD) partir de variáveis sociodemográficas, com destaque para as mulheres que têm menos filhos do que o desejado e que apresentam, portanto, uma fecundidade discrepante negativa (FDN). Foram utilizados os dados da Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher de 1996 e 2006. Os resultados mostram que a

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in NDF associated with fewer children, higher educational attainment, older age at first childbirth, and less time available to achieve the ideal number of children.

Keywords: Reproductive preferences. Discrepant Fertility. Unmet demand for fertility planning. Gender relationships. NDHS. Brazil.

tendência de aumento da FDN está associada ao menor número de filhos, à maior educação feminina, ao aumento da idade ao ter o primeiro filho e ao menor intervalo de tempo disponível para se atingir o número ideal de filhos.

Palavras chave: Preferências reprodutivas. Fecundidade discrepante. Demanda insatisfeita por planejamento familiar. Relações de gênero.

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Introduction

One of the great concerns in Brazil related to the fertility preferences implementation has been, until recently, the identification and analysis of factors that lead to positive discrepant fertility (DF), i.e., women having more children than the declared ideal, the result of an unmet need for family planning (Tavares, Leite and Telles, 2007). Nevertheless, in the last several decades, fertility has been reduced so quickly that today it is clearly below replacement level, with a total fertility rate (TFR) of 1.7 children per woman in the five-year period from 2010 to 2015 (IBGE, 2013). In the 2000s, the average ideal number of children declared by Brazilian women aged 15 to 49 was 2.1, while the observed fertility was 1.8 children (Berquó and Lima, 2008). Thus, Brazilian women, on average, ended their reproductive period⁴ with fewer children than they declared ideal, resulting in negative discrepant fertility. Fertility rates below replacement level are a common phenomenon in many Latin American countries and the number of women who wish to have more children than they actually have is rising. This suggests an inability to achieve desired fertility (Bongaarts, 2001; Wong, 2009; Esping-Andersen, 2013).

Despite this being a reality for a large part of the Brazilian population, in fact many women, particularly in the North and Northeast regions –who have lower educational attainment and lower income status– experience the opposite, i.e., have more than desired fertility. An important proportion of women still have, on average, more children than desired. Thus, there is a high number of unwanted pregnancies, abortions, and women who do not want more children or wish to have them later, but who experience ineffective use of contraception. These women thus have an unmet need for contraception (Tavares, Leite and Telles, 2007; Carvalho, 2014).

The gap between the declared ideal number of children and observed fertility, be it higher or lower –called discrepant fertility– is an important indicator for evaluating the implementation of reproductive preferences and access to sexual and reproductive health services. It would also be an estimation of the extent to which their reproductive rights are respected, since it measures the inability of a population to implement their reproductive preferences (Bongaarts and Sobotka, 2012; Esping-Andersen, 2013).

Harsh criticisms are made of the available variables for ideal/desired family size derived from responses to the DHS – Demographic and Health Surveys (Thomson, 1997; Morgan and Kind, 2001; Santelli, Rochat and Hatfield-Timajchy, 2003; Santelli, Duberstein and Mark, 2009). Furthermore, in order to understand the contemporary low fertility rates, it is necessary to understand the motives that lead people to their fertility preference implementation or not (Morgan and Taylor, 2006). Thus, it is important to analyze reproductive desires and intentions, as well as fertility preferences, alongside studies of fertility itself.

Within this framework, this study aims to analyze the fertility preference implementation among married/in-union women between 35 and 49 years old, using the concept of discrepant fertility (DF), particularly the negative discrepant fertility (NDF), when women have fewer children than desired. This study also identifies the profile of this group and its relation to socio-demographic factors, in a comparison of data from the National Demographic and Health Surveys for Women and Children (NDHS) from 1996 and 2006.

4 Generally defined as the age group 15-49.

Discrepant Fertility: Desired and Actual Fertility

The concept of fertility gap has been present in discussions about sexual and reproductive health since the 1960s, with the first surveys about knowledge, attitudes and practices related to contraception (*Knowledge, Attitudes, and Practices - KAP*). These surveys showed a gap between fertility intentions and contraceptive behavior for a significant contingent of women, illustrated by the fact that many women had more children than their declared ideal number. This fact, popularized by the expression *KAP-GAP*, has been the object of innumerable studies (Casterline and Sinding, 2000; Bradley and Casterline, 2014).

The continued availability of data provided by surveys about the topic in the subsequent decades (*World Fertility Survey, Contraceptive Prevalence Surveys, and Demographic and Health Surveys*) allowed studies to be carried out in several countries with the objective of measuring and understanding the discrepancy between realized and ideal fertility preferences, notably the unmet demand for contraceptive use. These studies allow for discussion about the “gap between the ‘need’ for family planning and its use ‘discrepant behavior’”, especially after the Cairo Conference in 1994 that exposed the importance of developing public policy focused on family planning with the objective of helping couples and individuals achieve their reproductive preferences, thus avoiding unwanted pregnancies (Freedman and Coombs, 1974; Westoff, 1978, 1988; Westoff and Bankole, 1996; Casterline and Sinding, 2000).

Due to the growing importance attributed to reproductive preference implementation, the topic remains central to many studies (Cleland *et al.*, 2006; Bongaarts *et al.*, 2012; Darroch and Singh, 2013; Cleland and Shah, 2013; Peterson, Darmstadt and Bongaarts, 2013). It remains on the international political agenda being part of the Millennium Development Goals (MDG) and more recently of the Sustainable Development Goals (SDG) (UN, 2015).

Many indications of NDF arise alongside analyses of demand for contraception and positive discrepant fertility. NDF is particularly relevant in cases with below-replacement fertility, in which there may be gaps between the desired and actual number of children and the actual number of children, possibly due to an unmet demand for children, thus indicating a need for public policies (Philipov, 2009; Liefbroer, 2009). Fertility gaps between realized and desired fertility is defined by “observation that actual fertility is lower than the ideal number of children that people would like to have in their lives”. This growing gap has often been described as “unmet need for children” (Philipov *et al.*, 2009: 79).

Among the variables studied in attempts to understand what leads to this behavior are changes in time of fertility (Demeny, 1997), postponement of maternity until a more advanced age, and competition with other activities in modern society, in which couples often have simultaneous preferences and/or priorities, some mutually exclusive. These may lead to women reaching the end of their reproductive periods with fewer children than the ideal number expressed in surveys.

Bongaarts (2008) shows that this gap between the ideal family size and observed fertility, with an unmet demand for children, is basically due to two general causes. The first involves three dimensions of obstacles to realization of ideal family size: economic, related to the high cost of children, whether direct (raising and educating the children) or indirect (opportunity costs of having children for working parents); social, involving increased individualism, culturally defined gender roles, difficulty in finding an adequate partner, marital disruption, difference in preferences of the partners, and a desire for a

lifestyle or career that is incompatible with fertility; and, biological, linked to the incapacity to conceive or carry a pregnancy to term, since infertility and pregnancy risks are known to increase with age.

The second cause relates to the temporal effect, since it is known that the total fertility rate (TFR) is declining, especially where childbearing is postponed (Demeny; 1997). He affirms that global pro-natalist policy should focus on all the factors that lead to actual fertility lower than the ideal, and not focus solely on economic factors (Bongaarts, 2008).

Studies in developed countries show that despite fertility declining to levels well below replacement level, men and women continue to respond that they would like to have at least two or more children (Goldstein, Lutz and Testa, 2003; Hagewen and Morgan, 2005; Adsera, 2006). Régnier-Loilier and Vignoli (2011) examined fertility intentions and behavior in France and Italy, comparing different aspects of fertility (desires, intentions, implementation, and associated factors) and testing differences and similarities between French and Italian lifestyles. They show that despite the similar desired number of children in both countries (two children), actual fertility is very different (1.3 in Italy and 2 in France). One of the explanations is that there are differences in the social and economic profile of women whose desired fertility is one or two children in both countries, which results in distinct fertility rates. Moreover, and perhaps more critical for these fertility discrepancies, there are different objective (socio-economic characteristics such as education, employment, income and work-family balance policies) and subjective (women's life plans and gender relations between partners) factors that help or hinder realization of the declared intentions in these countries.

A large percentage of women, not only in European countries, but also in Latin America, reach the end of their reproductive period with fewer surviving children than their ideal family size. Chackiel and Schkolnik (2003) identify this profile in Mexico. In Uruguay, Peri and Pardo (2008) confirm a general tendency toward NDF, since the reproductive period results in a desired fertility equal to the observed fertility only among those with a higher socioeconomic status and those who have had two or three children. In relation to the unmet demand for children, they revealed that one in three women reaches the end of her reproductive period with fewer children than desired.

According to Hakkert (2003), the percentage of women with fewer children than desired varies from 24.2% among all women ages 45-49 in Nicaragua (1998) to 41.1% in the Dominican Republic (1996). In those two countries, this percentage is larger than the percentage of women ages 45-49 whose fertility rate surpassed declared preferred family size. For Hakkert, although it is likely that the emotional and economic costs associated to the unmet demand for children are often less than the costs related to excess fertility, this fact cannot be ignored if the objective is to quantify the correlation between individual preferences and fertility results. In Brazil, the author affirms that, in 1996, 30% of women aged 45-49 had a smaller family size than their declared ideal.

Wong (2009) finds similar results and shows that the number of desired children in Haiti, Colombia and the Dominican Republic are very similar, regardless of the phase of fertility transition in those countries and social strata. The author also reveals a considerable decline in fertility at all socioeconomic levels, which suggests that women from different social strata and not just from higher strata have fewer children than desired. Data that compares the ideal number of children and TFR in the Dominican Republic in the 2010s shows an increase in NDF (CESDEM, 2015). This is one sign that NDF are increasingly present

on the continent. In the case of Peru, however, this indicator is present among all income quintiles, except for the first, indicating that this is a general phenomenon (INEI, 2015).

Methodological Procedures

In this study we use the National Demographic and Health Surveys for Women and Children (NDHS) from 1996 and 2006 which follow the DHS (*Demographic and Health Surveys*) model. The variable of interest, the discrepant fertility (DF), is created by subtracting the number of desired children (NDC) from the number of live births (NLB) (Formula 1). We classify the difference.

$$DF = NLB - NDC \quad (1)$$

- a) no discrepant fertility if the difference is zero;
- b) positive discrepant fertility (PDF) if the difference is positive;
- c) negative discrepant fertility (NDF) if the difference is negative.

We analyze the profile of married/in-union women between ages 35 and 49 according to these types of DF.⁵ The variables used in the analysis include geographic region, household type, education level, age, race, religion, age at first childbirth, *parity*, use and type of contraception, paid employment, partner's desire for children, and number of unions. In order to analyze the behavior differences among different social classes, this study classifies the population according to the Brazilian Economic Classification Criterion.⁶ Gualberto's (2003) variable, "woman's status", which takes into consideration suggestions made by Goldani (1994), Mason (1984), Evans (1992) and Kishor and Neitzel (1996), was reapplied with a few adaptations due to the availability of the database and due to the addition of new questions relevant to the aims of this study. Thus, the Gender Index has five dimensions: education, employment, head of household, access to media and relationship between partners, the latter having the most weight in the index (see index details in Annex 1).

We calculated simple descriptive statistics in order to characterize women according to their discrepant fertility status (no DF, NDF or PDF). Then we compare the differences between women with no DF and NDF. The bivariate statistics were coupled with a significance test for means and Cramer's correlation test. Finally, we fit a multinomial logistic regression model in order to identify possible relationships between women having fertility gaps and sociodemographic characteristics (Gujarati, 2006). We analyzed DF in general terms with the intent of inferring what would lead a woman to have a discrepancy (positive or negative) or not. Women without DF were used as a reference point. We performed goodness of fit tests by analyzing the VIF (variance inflation factor) to aid in the diagnosis of multicollinearity, a common problem that may affect parameter estimates. We also conducted a Wald test to assess the importance of variables in the model and to determine the statistically significant variables that should remain in the model. Lastly, we did a likelihood ratio test in order to compare models with and without the tested variables of interest in order to assist in the selection of the best model (Wooldridge, 2008).

5 We assume that at these ages women have few chances of increasing fertility and changing the difference between the number of surviving children and the ideal number of children.

6 We used the Brazil Criterion from 2013. For more information, consult ABEP (Brazilian Association of Research Companies), available at: <<http://www.abep.org/criterio-brasil>> (accessed on 4th February 2013).

Results and Discussion

The data from Table 1 shows that, as expected, the percentage of women who have fewer children than desired increases with age, since the exposure to risk is greater, while NDF is greater among younger groups that may not have had time to achieve their reproductive preferences. Nevertheless, in the decades studied, there is an important increase in the percentage of women, even from older age groups, who have fewer children than they would like both among women in general and married/in-union women. In 1996, a little under ¼ of married/in-union women ages 45-49 had fewer children than desired whereas in 2006 that percentage had increased to about ⅓. Therefore, there is higher occurrence of NDF in the studied decade, especially for age groups near the end of their reproductive period.

Table 1
Percentage distribution of women according to Discrepant Fertility (DF) by age group. Brazil 1996 and 2006

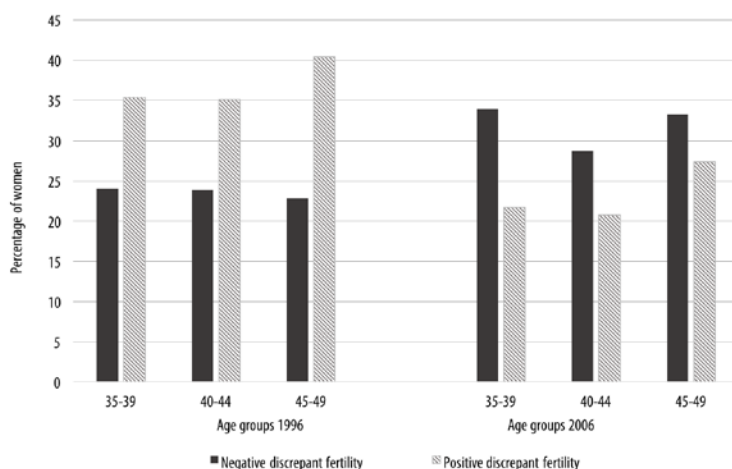
Age group	NDF		No DF		PDF		N	
	Total	Married/ in-union	Total	Married/ in-union	Total	Married/ in-union	Total	Married/ in-union
1996								
15-19	92.08	75.81	6.17	15.59	1.75	8.60	2520	359
20-24	73.41	60.51	16.86	23.03	9.73	16.46	1979	938
25-29	52.47	43.65	28.58	33.65	18.96	22.70	1942	1384
30-34	34.60	29.54	36.46	40.35	28.94	30.11	1847	1486
35-39	28.01	23.98	38.86	40.64	33.13	35.37	1702	1368
40-44	26.16	23.89	39.08	40.97	34.77	35.13	1374	1086
45-49	25.21	22.84	34.99	36.72	39.80	40.44	1128	864
Total	51.68	35.08	26.86	35.73	21.46	29.19	12492	7485
2006								
15-19	86.50	84.17	11.50	11.79	2.00	4.04	2504	619
20-24	73.06	64.78	18.13	23.02	8.81	12.25	2576	1411
25-29	57.60	50.24	26.24	31.81	16.14	17.94	2386	1644
30-34	41.31	38.63	38.26	39.93	20.42	21.45	2164	1688
35-39	37.23	33.95	41.83	44.34	20.99	21.68	2111	1688
40-44	32.19	28.77	47.58	50.52	20.23	20.74	2066	1630
45-49	34.77	33.28	38.84	39.33	26.33	27.41	1766	1289
Total	53.82	43.98	30.57	36.85	15.60	19.18	15573	9969

Source: NDHS 1996 and 2006

In Figure 1, with only the older age groups of married/in-union women, who are expected to be closer to their final fertility, it is noted a significant reversal in the overall pattern of reproductive preference implementation for the decade analyzed. Although in 1996 the proportion of women with more children than desired was prevalent, this trend was reversed in 2006, when there was a higher prevalence of women with fewer children than desired. Hence, in 2006, the percentage of married/in-union women who

had reached the end of their reproductive period with fewer children than desired was greater than the percentage of those who had surpassed the desired number of children and those who had the desired number of children, especially among married/in-union women (44%, 19% and 37%, respectively). If attitudes that determine the ideal number of children do not change, the trend observed in 2006 is expected to continue and intensify in the future, since 2010 census data and fertility projections indicate a substantial decline in fertility rates, with increased postponement of first births, as well as ongoing education and inclusion of women in the job market, all of which could accentuate NDF (Cavenaghi and Alves, 2011).

Figure 1: Married/in-union women according to discrepant fertility (DF) by age group. Brazil, 1996 and 2006 (%)



Source: NDHS 1996 and 2006

Upon analysis of the group of married/in-union women aged 35-49, we observed (Table 2) that among this group the percentage of women who had fewer children than desired was quite significant when the ideal number of children was three or four. Moreover, this percentage has increased over time. Among women aged 35-39 who desired 3 children, 38.6% had up to two children in 2006; among women ages 40-44 that percentage was 40.8%. Those percentages are much higher when compared to the percentages of women who had more children than desired in the same period (7.28%, 6.59% and 11.6%, respectively). Although there is a possibility that women between 35 and 49 years old who have fewer children than desired will achieve their desired fertility by the end of their reproductive period, fertility in Brazil after 35 years old is known to be very low.

Data shows that unsatisfied fertility desires due to unmet demand for children – NDF – is a relatively important phenomenon. Thus, unplanned children and excess fertility should not be the only motives for research about the development of reproductive preferences.

According to studies by Kohler, Behrman and Skyttke (2005) and Frejka and Sardon (2006), the number of children and age at first childbirth (for women who had already given birth to at least one live-born child) are two variables which show a relationship with realization of reproductive preferences. The latter relates to the beginning of reproductive life; the younger a woman is at first childbirth, the longer she will have to achieve or

surpass desired fertility. Likewise, a greater number of children indicates a greater chance of achieving the ideal number of children.

Table 2
Percentage distribution of married/in-union women according discrepant fertility (DF)
by age group, parity and number of desired children

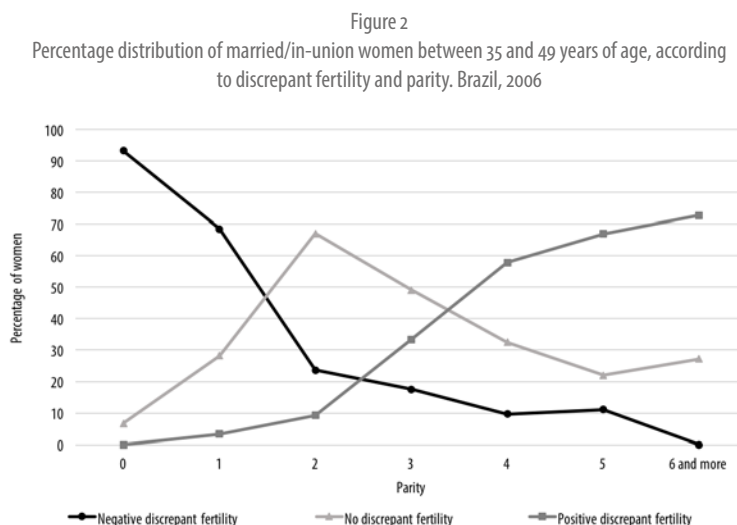
Age group	Average parity	Number of desired children	Negative DF	No DF	PDF	n
1996						
35-39	3.02	1 child	7.04	21.94	71.02	131
		2 children	16.62	44.66	38.72	511
		3 children	23.12	57.55	19.33	314
		4+ children	43.63	41.7	14.68	146
40- 44	3.35	1 child	9.69	29.02	61.30	77
		2 children	16.19	37.81	46.00	352
		3 children	20.46	55.3	24.24	266
		4+ children	35.17	49.17	15.66	132
45-49	3.61	1 child	2.28	17.23	80.48	51
		2 children	14.52	30.52	54.96	255
		3 children	26.30	49.26	24.44	197
		4+ children	41.37	38.5	20.14	123
2006						
35- 39	2.2	1 child	10.05	46.89	43.06	209
		2 children	32.55	49.18	18.27	854
		3 children	38.61	54.11	7.28	316
		4+ children	67.63	25.9	6.47	139
40- 44	2.5	1 child	5.98	45.65	48.37	184
		2 children	20.69	59.55	19.76	754
		3 children	39.83	53.58	6.59	349
		4+ children	53.38	36.09	10.53	133
45- 49	2.7*	1 child	17.50	31.25	51.25	160
		2 children	22.59	45.75	31.66	518
		3 children	40.80	47.6	11.60	250
		4+ children	55.73	33.59	10.69	131

Source: NDHS 1996 and 2006

* Average parity of the 35-59 cohort in 1996 (3.02) should be less than or equal to the parity of the same cohort 10 years later (2006). However, in 2006, women aged 45-59 had an average of 2.7 children. This is probably due to sampling problems.

Thus, especially for 2006, Figure 2 shows that the higher the parity of the woman, the lower the percentage of those with NDF. The point at which women seem to have the smallest discrepancy is when they have two children, or when they achieve the ideal

number suggested by the studies of Berquó and Lima (2008) and also frequently observed in Europe (Sobotka and Beaujouan, 2014).



Source: NDHS 2006

In an effort to understand the factors associated with NDF, we include a descriptive analysis of sociodemographic variables below (Table 3). In this case, women with PDF were excluded. Women with NDF are particularly concentrated in the South, Midwest and Southeast regions as well as Brazil's urban areas, both in 1996 and 2006. The differences between rural and urban areas decreased (increase of 48% of women with NDF between 1996 and 2006 in rural areas). We also observed a large increase in the percentage of women who desired more children than they had at the time of the survey in some regions (48% and 44% for the Northeast and North, respectively). Despite apparent differences, they did not remain significant throughout the decade, except in the North. The higher the socioeconomic strata, the higher the percentage of women with NDF. Yet, in 2006 these differences no longer appeared significant. In relation to educational attainment, the higher the level of education, the higher the percentage of women with NDF: in 2006 this percentage was very significant among women with 12 or more years of education. These percentages are statistically significant. However, the largest increase in NDF occurred among those with 0 to 3 years of schooling. In relation to age at first childbirth, given that infertility increases with age, it is easy to infer that the later a woman begins to have children, the greater the likelihood of her having a NDF due to an unmet demand for children. Conversely, the earlier a woman begins her reproductive life, the more likely it is that she will have more children than desired. In 1996, 75% of women who had children after age 35 had NDF, falling to 55% in 2006. This decrease in the percentage of women with fewer children than desired in 2006 in the oldest age group at first childbirth may reflect a change in general behavior in which, among women who postpone childbirth, having fewer children may become more acceptable. These findings support the study done by Kapitány and Spéder (2012) in four European countries, in which postponement of first childbirth was directly reflected in women not achieving fertility ideals, as well as increased chances of not having children.

Table 3 also indicates that in 1996 traditional Protestant women were least likely to fall into the NDF category whereas women with no religion were the ones who were most likely to fall into this category (the difference was statistically significant). Data for 2006, however, shows no statistically significant difference among the various religious classifications. Regarding employment, behavior is not very different for women who work and women who do not have paid employment, although a larger increase in the discrepant fertility occurred among those who work (35%). These results substantiate Becker's theory (1981), in which inclusion in the job market contributes to a greater opportunity cost of time for women. In relation to race, important differences appeared in 1996, showing that self-declared white women exhibited a significantly larger percentage of NDF when compared with black, mixed race, Asian and indigenous women, although this difference seems to disappear in 2006. It is interesting to note that a significant percentage of women, both in 1996 and 2006, reported using some form of contraception and were classified as having a NDF, indicating that there are possibly other factors relating to the process of achieving desired fertility, such as the social and emotional costs of investing in the career and, at the same time, having leisure time with children. The number of unions corresponds to different behaviors in the years analyzed: in 1996 women in their second or later union presented more NDF than women in their first union, whereas the opposite was true in 2006. Lastly, for the variable relating to the partner's desires, there was a higher rate of NDF among women whose partner desired fewer children than they desired (60% in 1996 and 90% in 2006). This group also registered the greatest increase over the course of the decade. Even among women who said their partner has the same view about the preferred number of children, the percentage of women reporting discrepant fertility was significant (more than 41%). These were statistically significant differences. This shows that the partners' desires interact with each other and one partner's desire for children may override the other's desire.

In order to illustrate the relationship between sociodemographic factors and discrepant fertility, Table 4 shows the logistic regression models. Each model contains stacked datasets and a dummy variable corresponding to the year (0=1996 and 1=2006). In the first, the dependent variable is women without DF (reference), women with PDF and women with NDF.

The year variable proved to be statistically significant, strengthening the validity of the differences observed over the decade. In 2006, women were 1.2 times more likely to have NDF than women in 1996. Once again, these findings show a change in the pattern of realization of reproductive preferences and the existence of a high rate of NDF in Brazil, indicating growth in the fertility deficit. The geographic regions prove important for determining the DF: the North and Northeast appear more likely to have women with more children than desired compared to the Southeast. The South, on the other hand, appears 40% more likely to have women with PDF than the Southeast. These findings confirm the expected dynamic for these regions, in which the North and Northeast, due to greater impairment and inequality in relation to access to family planning, have a greater percentage of women with unplanned/undesired births. In contrast, due to the higher levels of education and inclusion in the job market (and consequently the greater opportunity cost of having children), women residing in the South and Southeast have NDF with increasingly less frequency.

Table 3

Percentage distribution of married/in-union women between 35 and 49 years of age, according to discrepant fertility (DF) by sociodemographic variables. Brazil, 1996 and 2006

Woman's variables	No DF	NDF	Total	n	Significance test of means (F Statistic)	Value and significance (Cramer's V)
Geographic region	1996					
	North	71.08	28.92	100	175	0.020
	Northeast	57.84	42.16	100	521	0.025
	Southeast	63.51	36.49	100	418	0.637
	South	66.61	33.39	100	389	0.060
	Midwest	59.16	40.84	100	481	0.113
	2006					
	North	63.76	36.24	100	396	0.104
	Northeast	56.89	43.11	100	516	0.537
	Southeast	58.78	41.22	100	803	0.885
	South	57.69	42.31	100	922	0.701
	Midwest	59.87	40.13	100	755	0.620
Place of residence	1996					
	Urban	62.79	37.21	100	1.642	0.829
	Rural	62.12	37.88	100	342	0.829
	2006					
	Urban	58.41	41.59	100	2.312	0.779
Education (in years)	Rural	59.32	40.68	100	1080	0.779
	1996					
	0 to 3	59.68	40.32	100	503	0.155
	4 to 7	64.67	35.33	100	681	0.211
	8 to 10	64.72	35.28	100	258	0.497
	11	64.57	35.43	100	338	0.487
	12 or more	56.97	43.03	100	203	0.116
	2006					
	0 to 3	56.19	43.81	100	642	0.422
	4 to 7	63.88	36.12	100	1.039	0.021
	8 to 10	63.07	36.93	100	577	0.169
	11	57.93	42.07	100	673	0.734
	12 or more	49.58	50.42	100	434	0.009

Continued

Continued

Woman's variables	No DF	NDF	Total	n	Significance test of means (F Statistic)	Value and significance (Cramer's V)
Economic strata	1996					
	A and B	63.55	36.45	100	417	0.808
	C	67.22	32.78	100	716	0.004
	D and E	57.85	42.15	100	770	0.001
	2006					
	A and B	57.13	42.87	100	821	0.383
	C	60.46	39.54	100	1539	0.373
	D and E	59.06	40.94	100	807	0.998
Age at first childbirth	1996					
	<= 35 years old	67.72	32.28	100	1.809	0.000
	> 35 years old	24.61	75.39	100	63	0.000
	2006					
	<= 35 years old	64.23	35.77	100	3.095	0.0288
	> 35 years old	45.09	54.91	100	95	0.0288
Current religion	1996					
	Catholic	62.96	37.04	100	1.529	0.676
	Traditional Protestant	77.33	22.67	100	40	0.053
	Pentecostal	64.53	35.47	100	283	0.521
	No religion	48.33	51.67	100	53	0.060
	Other	54.03	45.97	100	79	0.145
	2006					
	Catholic	58.02	41.98	100	2294	0.638
	Traditional Protestant	61.86	38.14	100	403	0.367
	Pentecostal	62.07	37.93	100	394	0.409
	No religion	57.29	42.71	100	115	0.858
	Other	52.16	47.84	100	186	0.248
Paid employment	1996					
	No	56.35	43.65	100	187	0.178
	Yes	62.14	37.86	100	1099	0.178
	2006					
	No	57.79	42.21	100	399	0.718
	Yes	56.1	43.9	100	1739	0.718

Continued

Woman's variables	No DF	NDF	Total	n	Significance test of means (F Statistic)	Value and significance (Cramer's V)
Race/color	1996					
	White	59.06	40.94	100	1.040	0.004
	Others	65.98	34.02	100	944	0.004
	White	57.13	42.87	100	1.593	0.332
	Others	59.93	40.07	100	1799	0.332
Use and type of contraception method	1996					
	Does not use	40.15	59.85	100	452	0.000
	Sterilization	71.73	28.27	100	1123	0.000
	Uses other	62.84	37.16	100	409	0.941
	Does not use	35.43	64.57	100	381	0.000
	Sterilization	71.87	28.13	100	1859	0.000
	Uses other	54.22	45.78	100	1022	0.003
Number of unions	1996					
	First union	64.58	35.42	100	1.736	0.000
	Later unions	48.58	51.42	100	244	0.000
	First union	58.19	41.81	100	2.801	0.000
	Later unions	60.16	39.84	100	581	0.000
Partner's desire for children	1996					
	Same desire	68.26	31.74	100	1.268	0.000
	Desires more	61.89	38.11	100	296	0.553
	Desires fewer	41.04	58.96	100	247	0.000
	2006					
	Same desire	51.27	48.73	100	1.061	0.002
	Desires more	53.94	46.06	100	218	0.220
	Desires fewer	10.41	89.59	100	141	0.000

Source: NDHS 1996 and 2006

Note: *italic* indicates significant statistics

Contrary to the expected results, differences by place of residence did not show statistical significance, nor did religion, social class, race/color, or decisions about the woman's income.⁷ It is important to highlight that, more importantly than demonstrating the

7 The VIF analysis in the regression (Table 4) did not indicate collinearity with any variable, so we performed the likelihood ratio test without the variables that were not significant in the Wald test in order to find the best model, comparing the complete (saturated) model with the smaller (reduced) model. The test showed a significance of 0.038, indicating that despite the variables not appearing statistically significant, the saturated model was preferred to the reduced model.

absence of variations in the DF, this result indicates that the changes in fertility outcomes are not related to these characteristics.

The occurrence of NDF differs by age group: the 40-44 age group appears to be less likely to have either negative or positive DF compared to women in the 35-39 age group. Educational attainment also appears related to NDF: the higher the level of educational attainment, the greater the likelihood of a NDF, especially for groups with 8 to 10 years of formal education and 12 or more years of formal education, compared to the group with 0 to 3 years of formal education. Conversely, the higher the level of educational attainment, the lower the likelihood of having a PDF, consistent with the findings of Hakkert (2003), in which the fertility deficit in eight Latin American countries for women between 40 and 49 years of age was greater among those with higher educational attainment. The effects of collinearity are also present: women with higher educational attainment generally have their first child at a later age, which signifies less time exposed to the risk of having children. Additionally, highly qualified women also encounter greater opportunity costs, which make the decision to achieve higher-order parity less likely. Despite many studies obtaining this result, some European countries, such as France, have experienced the opposite. When compared to French women with lower educational attainment, the more educated women present higher fertility rates and thus a smaller gap between fertility preferences and achieved fertility. Although dealing with populations with very low fertilities (lowest-low fertility), it is possible that educational attainment has a twofold effect depending on the conditions offered by the State for maintaining a work-family balance (Bellani and Esping-Andersen, 2013).

The partner's desired number of children also shows an important relationship with DF in the studied period, since women whose partners desired fewer children than they had doubled the likelihood of a NDF compared to women whose partners shared their ideal number of children. These results indicate the importance of the partners' desires regarding fertility gaps. The models suggest that women with fewer children than desired may have been influenced by their partners, who, according to the women themselves, wanted to have fewer children. Hakkert's study (2003) presents similar findings, which show a positive relationship between partners who desired fewer children and a child deficit for the women. These results provoke discussion about gender equality in the conjugal relationship, (dis)empowerment of women, and the bargaining power of each partner in relation to fertility desires, topics that the data from the NDHS does not clarify. On the other hand, the effect of the partner's desires in relation to PDF is less clear. Results indicate that the likelihood of a woman having more children than desired doubles when her partner wants a different number of children than her. Since the woman reported her partner's fertility desires, there is a chance that she has mistaken his ideal number of children.

The model also indicated that the number of unions and the gender index (Appendix 1) appeared related to discrepant fertility. Women in their second or later union had an increased likelihood of having more children than desired, a finding that may be related to remarriage stimulating new childbirths which were not in the woman's initial plans. Marcondes (2008) raises similar questions. This variable does not appear to be significant for NDF.

Table 4

Multinomial logistic regression (ref. women without fertility gaps) to explain negative and positive discrepant fertility (NDF and PDF) among married/in-union women between 35 and 49 of age. Brazil, 1996 and 2006 (n=2276)

Explanatory variables	NDF		PDF		VIF	Wald test
	Odds ratio		Odds ratio			
Survey year						
1996						
2006	2.121	***	0.645	*	2.800	***
Region						
Southeast						
North	0.850		1.508	*	1.450	***
Northeast	1.118		1.668	**	1.880	
South	1.023		0.593	**	1.780	
Midwest	1.217		0.944		1.630	
Place of residence						
Urban						
Rural	1.089		1.302		1.210	
Age group						
35 to 39						
40 to 44	0.672	**	0.778	*	1.200	*
45 to 49	0.965		0.862		1.200	
Years of formal education						
0 to 3						
4 to 7	0.759		2.169	***	1.590	***
8 to 10	1.446	*	0.820		1.320	
11	1.030		0.366	***	1.650	
12 or more	1.439		0.454	**	1.860	
Race/color						
Non-white						
White	0.763	*	0.971		1.270	
Religion						
Catholic						
Traditional Protestant	0.621		0.977		1.080	
Pentecostal	0.790		0.779		1.070	
No religion	1.444		1.338		1.030	
Other	1.174		1.305		1.070	
Employment						
Yes						
No	1.333		1.284		1.280	

Continued

Continued

Explanatory variables	NDF	PDF	VIF	Wald test
	Odds ratio	Odds ratio		
Economic Strata				
C				
A and B	0.982	0.853	1.620	**
D and E	1.260	1.198	1.780	
Partner's desire for children				
Same desire				
Desires more	1.022	2.062	***	1.080
Desires fewer	3.089	***	2.134	***
Number of unions				
First union				
Later union	1.000	2.222	***	1.230
Gender index	1.015	1.143	*	3.410
Decision about woman's income				
She decides				
He decides	1.363	0.693		1.180
Mutual decision	0.752	*	0.887	1.480

Source: Logit and logistic models designed by the authors based on data from NDHS in 1996 and 2006

*** $p < 0.001$; ** $p < 0.050$; * $p < 0.100$

Contrary to expectations, a one-point increase in the gender index (i.e., greater equality) increased the likelihood of a woman having more children than desired by 14%. This variable was not significant for NDF. These results may be influenced by the low explanatory power of the variable, as acknowledged by Carvalho, Wong and Miranda-Ribeiro (2014). The authors argue that gender relations are increasingly associated to conjugal relationship issues (such as childcare and leisure time with the children, division of household chores, etc.) which are less noticed by quantitative data and variables. The study also indicated, based on qualitative data, that there is a complex negotiation process between the couple, in which individual bargaining power becomes a key element in the achievement of reproductive preferences. Paid employment, on the other hand, appears to have little effect on the achievement of reproductive preferences. This is similar to Hakkert's (2003) finding for eight Latin American countries.

Final Considerations

Given the low fertility levels achieved by Brazil in recent decades and the future trend of continuing decline, analysis of reproductive preferences and their realization becomes increasingly important for understanding this pattern. This study analyzes the phenomenon of discrepant fertility and identifies possible relationships with women's sociodemographic characteristics.

Analysis reveals that the substantial decline in fertility reflected on the desired number of children in the analyzed decade. In the past, there was a PDF between observed

fertility (greater) and desired fertility (lower). Discrepant fertility remained, but in the opposite manner. There has been a statistically significant increase in the number of women who reach the end of their reproductive period with fewer children than desired, in such a way that NDF have become relevant. Reproductive preferences, and their realization, have changed considerably in Brazil. Although still a relatively unexplored subject, this study shows a growing number of women with fewer children than desired, surpassing those who exceeded their ideal fertility.

It is necessary to consider the peculiarities of this phenomenon. NDF decrease according to a woman's parity since when a woman has a child the likelihood of her achieving her ideal fertility increases. The largest percentage of women with NDF is composed of women with higher order parity desires (third or fourth order). Due to the decline in fertility and the increase in the percentage of the group of women with up to two children, the group of women with fertility gaps that grew by the greatest percentage during the studied decade was that of women with one or no children.

The first important observation is that many variables, such as geographic region, place of residence, economic strata, religion, race/color, etc., that played a significant role in defining the profile of women with fewer children than desired in 1996, lost their significance in characterizing this group in 2006. In some way this indicates a generalization of NDF and their expansion to diverse socioeconomic profiles. Yet, some variables still seem to have a strong effect on determining it, since these are directly related to age at first childbirth. The older the woman at first childbirth, the greater the likelihood of her not achieving her preferred number of children, whereas the younger a woman is at first childbirth, the greater the likelihood of her reaching the end of her reproductive period with more children than her stated preference. Educational attainment also strongly influences NDF, which are more prevalent among more highly educated women – especially those with 12 or more years of formal education, among whom this percentage reaches 48%. As expected, the likelihood of having more children than desired is greater for less educated women and for those from the North and Northeast.

When considering that reproductive behavior involves, in most cases, a couple's decision, whose individual desires need to be accommodated in one single action, it is necessary to analyze the impact of the partner's desire for children. To this effect, data shows that the decision to have children is strongly related to the partner's desire: men's desire appears quite linked to women's achievement of fertility preferences, thus women with partners who desired fewer children were much more likely to have a NDF than women whose husbands desired the same number of children. This result leads the way for a series of hypotheses in the field of gender relations and fertility in Latin America, which urges to research. The decision-making process regarding children is quite complex since it involves ambiguity. Surprisingly, studies observed a considerable percentage of women who, despite being classified as having fewer children than desired, use contraception, especially in 2006. These findings suggest that despite desire for children, there are other factors in reproductive behavior that ultimately assume more importance in a woman's decision to achieve her stated reproductive preference. Such factors must be identified and analyzed in order to develop policies that guarantee reproductive preference implementation.

Based on these results, we believe that in the near future negative discrepant fertility will become more relevant and increasingly frequent among couples in Brazil, unless the average number of desired children decreases. Evidence mentioned here confirms this

forecast for Latin America. In addition to the trend of higher education levels among women, according to the 2010 census, fertility at younger ages is declining, which may lead to fertility postponement. The behavior of these two variables, together with women's inclusion in the job market and continued gender inequality in childcare and household chores, creates a clear pattern of negative discrepant fertility. Given these facts, investment in public policy centered on work-family balance, such as quality public daycares, more flexible work hours, longer paternity/maternity leave and investments in education, is necessary in order to establish gender equality as a means of guaranteeing reproductive rights for these couples and avoiding lowest-low fertility levels in the next decades. A low fertility level may conflict with individuals' reproductive goals and may constitute a violation of reproductive rights, specifically in Latin America.

Despite significant growth in negative discrepant fertility in Brazil and the importance of this subject for sexual and reproductive rights, it is important to highlight that due to the vast diversity of behavior and unequal access to contraceptive methods, Brazil still has a significant number of women with positive discrepant fertility, i.e. women who have undesired or unplanned children. This phenomenon is more prevalent among less educated women and those who start their reproductive life at a younger age. As such, Brazil simultaneously experiences two phenomena that demand attention and public policy.

The importance and difficulty of measuring and understanding the discrepant fertility phenomenon in countries such as Brazil should be emphasized. One obstacle to better comprehension of this phenomenon is the ambiguity of terms such as gap, discrepancy and dissatisfaction. Interpretation interferes in the measurement of the problem within the reproductive rights and public policy agenda, just as the effect of rationalization interfered in the measurement of excess fertility in the past. Currently many individuals may not admit their true desire to not have children when surveyed about their desires and intentions for children and achievement of reproductive preferences since they may not be willing to contradict the standing social norm in Brazil – of having children.

Finally, we must consider two important methodological aspects on the research agenda. On one hand, the discrepant fertility comparison in this study was done based on the number of births, not the number of surviving children. This is due to the relatively low infant mortality rate in Brazil and the almost negligible difference between live-born children and surviving children. However, in contexts in which the ideal number of children is subject to rationalization based on the number of surviving children, analyses considering fertility and infant-youth mortality should be conducted. On the other hand, the definition of a discrepant fertility itself transcends the demographic dimension. Studies that had better define what reproductive preferences are, when inabilities to achieve them arise (especially when dealing with negative discrepant fertility), and in which circumstances non-realization constitutes a violation of reproductive rights need to urgently be invested in.

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Annex 1
Breakdown of Gender Index

Dimension	Characteristic	Points
1. Education	Woman with education level equal to or superior to that of partner	1
2. Work	Woman who works beyond household chores	1
3. Head of household	Woman who is head of household in strata A or B	1
4. Access to media	Woman declares having access to media, such as television, radio, newspapers or magazines	1
5. Relationship between partners	Age difference equal to or less than 10 years with current partner	1
	Talks about family planning with partner	1
	Is the only one to decide what to do with money she earns	1
	Can deny sex to husband when tired or uninterested	1
Total		8

Source: Designed by the authors