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Abstract

This study analyzes the profile of female sterilization in Brazil by age, parity, type of delivery, place of delivery, color/race, region of residence, years of schooling, marital status, and number of unions. The descriptive analysis is based on the 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS), which has information on history of pregnancies with live births from 2001 to 2006. Results suggest that: (1) women with high levels of sterilization, high percentages of more than one pregnancy in the period, and larger parity than the desired number of children tend to have high parity, be black, brown, or indigenous, reside in the North or Northeast, have low levels of education, and have two or more unions; and (2) women with high levels of sterilization, low percentages of more than one pregnancy in the period, and lower parity than the desired number of children tend to have cesarean sections, give birth utilizing private health care obtained through a private insurance plan or direct out-of-pocket payment at private hospitals, and be married. The 1997 family planning law could be altered in order to allow female sterilization in conjunction with childbirth, as a way to attend the demand of Brazilian women in public hospitals. Policies are necessary not only to regulate the public sector, but also to aim better services at private institutions. Female sterilization should be discussed in the context of fertility below the replacement level, as one of its associated factors.

Keywords

Contraceptive Agents. Female. Sterilization. Reproductive Health. Brazil.

Introduction

Decline of fertility in Brazil is associated with the rise in the use of modern contraception.¹⁻⁵ Total fertility rate (TFR) fell from 6.28 children per woman in 1960 to 1.90 in 2010.⁶ The country is marked by significant regional differences in terms of the timing, pace, and scale of fertility decline.^{7, 8} The TFR in 2010 was 2.47 in the North, 2.06 in the Northeast, 1.7 in the Southeast, 1.78 in the South, and 1.92 in the Central-West region.⁶ In terms of contraception, pills and female sterilization are the most utilized methods.^{5, 9-13} Between 1996 and 2006, female sterilization declined from 38.5 percent to 25.9 percent. Women who use pills rose from 23.1 percent in 1996 to 27.4 percent in 2006. The use of condoms increased from 4.6 to 13 percent during the period. The percentage of women who were married to men who had obtained a vasectomy rose from 2.8 to 5.1 percent. The use of other modern methods (IUD, diaphragm, injections, etc.) rose from three to seven percent throughout the same period. The practice of withdrawal decreased from three to 2.1 percent. Women who utilized periodic abstinence fell from 2.9 to one percent between 1996 and 2006. Finally, women who did not use any method declined from 22.1 percent to 18.4 percent in the period.⁵

The federal government did not implement public policies to reduce fertility, change female reproductive behavior, or increase the use of contraception.¹⁴ The country has inadequate public services for sexual and reproductive health, predominance of the private sector, delayed and inappropriate use of contraceptives, insufficient medical care and reversible methods, high proportion of unwanted pregnancies, and social inequality effecting access to contraception.^{11, 15-19} Only in 1997 the government implemented a family planning law. One of the goals of the law #9,263 from January 12, 1996 was to enable sterilization in public hospitals, but with restrictions for surgeries during cesarean deliveries, childbirth, and abortion.²⁰

Studies investigate factors associated with female sterilization in Brazil, such as those that identify evidence of regret following this surgical procedure.^{5, 11, 21-27} Other studies evidence a frustrated demand for female sterilization.²⁸⁻³² Municipalities have insufficient public infrastructure and human resources to supply female sterilization.³¹ Extreme inequality in the access to female sterilization exists between the public and private sectors.²⁹ Despite the legal impediments, female sterilization is still held in conjunction with childbirth and cesarean section.^{1, 5, 33-37} Some studies suggest updating the family planning law to allow female sterilization after vaginal delivery.³² The prevalence of female sterilization is higher among older women with higher parity, fewer years of education, less educated spouses or companions, as well as among black and indigenous people.¹² Women with high levels of education get sterilized after they reach their ideal number of children, as a result of planning for a specific number of offspring through the use of temporary contraceptives. Poorly educated women get sterilized without having used another contraceptive

method, after reaching more than the ideal number of children while experiencing shorter birth intervals, demonstrating an increased incidence of regret for the total number of children ever born.⁵ The option for sterilization seems to be a result of higher fertility among women who started childbearing early in life.³⁸ Differentials in the risk of sterilization also take into account marital status (married, cohabiting/in union, not in union)³⁹ and number of unions.²

Due to this context, female sterilization is an important research topic in the area of reproductive health in Brazil. However, only 31 papers about female sterilization were published between 2000 and 2010 (out of 6,061 publications) in the main public health and medical journals available in the Scientific Electronic Library Online (SciELO).⁴⁰ This paper conducts a descriptive analysis about the profile of female sterilization in Brazil between 2001 and 2006. A series of characteristics of women are taken into account throughout this study: age at sterilization, parity at delivery, type of delivery, place of delivery, color/race, region of residence, years of schooling, marital status, and number of unions.

Methods

This study investigates the 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS). The analysis concerns women between 15–49 years of age at the time of the interview, who had experienced live births beginning in January 2001. The databases come from questionnaires with information on households/individuals (n=56,365), women (n=15,575), history of pregnancies since January 2001 (n=6,833), and history of all children born alive (n=27,477). The aggregation of variables from these different databases takes into account household, woman, and child identifications.

The database with information on households/individuals provides date of birth and years of schooling. The dataset on women includes traditional and modern contraceptive methods currently been used, month and year that the female sterilization took place, total number of children ever born alive, color/race, region of residence, marital status, and number of marriages/unions. Data on history of pregnancies inform the month and year of delivery/childbirth. The database about children born alive has information on type of delivery and place of delivery.

Based on the date of birth of each woman, date of sterilization and date of delivery/childbirth, it is possible to estimate the age of each woman at the time of sterilization. The number of children ever born (parity) at the time of each delivery is calculated based on the current parity and the birth order (month and year of each delivery/childbirth). The history of pregnancies allows the estimation of the number of pregnancies in the period. The analysis excludes women who did not remember their own date of birth, date of sterilization, or date of delivery/childbirth. In this study, parity at delivery, type of delivery, and place of delivery relate to information from the last birth. By this

way, the unit of analysis reports on women with live births between January 2001 and May 2007, and the final sample includes 4,580 women.

Information on female sterilization is used as the main variable of analysis, considering the month and year of sterilization. The variables used to explore the profile of female sterilization are: (1) woman's age in years at time of delivery (15–24, 25–29, 30–34, 35–49); (2) parity at delivery (1, 2, 3, 4+), calculated with information about number of children ever born and birth order; (3) type of delivery: vaginal birth or cesarean section; (4) place of delivery: home, public hospital with publicly-funded health care (“Sistema Único de Saúde” – SUS), hospital with private health insurance (“convênio”), public health center, or private hospital with direct out-of-pocket payment; (5) color/race of the woman: white, black, brown (“parda”), yellow (“amarela”), indigenous; (6) region of residence: North, Northeast, Southeast, Central-West, or South; (7) years of schooling: 0–3, 4–7, 8–10, 11+; (8) marital status: married, cohabiting (in union), or not in union; and (9) number of marriages/unions. Information on region of residence, years of schooling, marital status and number of marriages/unions might change over time. However, the database does not provide information for this variation, but only addresses the situation at the time of the interview.

Before constructing tables and figures, it was established the sample design (strata and conglomerate) and the expansion factor of women (weight) with the “svyset” command in Stata. The strata are the combination of the five major regions (North, Northeast, Southeast, Central-West, and South) and household situation (urban and rural). The primary sampling unit (PSU) is formed by the census tracts (conglomerate).

Results

The pregnancies analyzed in this study refer to the period from January 2001 to May 2007. The percentage of women sterilized is 15.32 percent (Table 1). Within this time period, there is a higher percentage of women who had more than one pregnancy among the sterilized (26.0 percent), compared to those who are not sterilized (18.2 percent). Sterilized women have greater parity than the desired number of children. Women who are not sterilized did not yet reach their desired number of children. Moreover, Table 1 indicates that the levels of sterilization increase with women's age. The younger women experienced the highest percentages of more than one pregnancy in the period. Women with at least 25 years of age have higher parity than the desired number of children. Finally, the percentage sterilized and the proportion of women with more than one pregnancy in the period increases with parity at the time of delivery of the last birth.

>>> Table 1<<<

Table 2 illustrates the distribution of women by type and place of delivery of the last child. Between 2001 and 2007, 55.1 percent of women had vaginal births, and 44.9 percent experienced

cesarean sections. The percentage of sterilization among women who had cesarean deliveries (24.4 percent) is much higher than among women who had vaginal deliveries (7.9 percent). The percentage of women with more than one pregnancy in the period is higher among those who had vaginal births, compared to women who had cesarean births. Parity is higher than the desired number of children among women who delivered vaginally. In the case of women who had cesarean births, the ideal number of children (2.1) is higher than the observed parity (1.8 children).

>>> **Table 2** <<<

In terms of place of delivery (Table 2), 75.2 percent of women gave birth in a public hospital (SUS), 15.4 percent utilized health insurance (“convênio”), and 7.9 percent had their children at a private hospital. The highest percentage of sterilization is observed among women at private hospitals (28.1 percent), followed by those who used health insurance (17.2 percent), and women at public hospitals (13.8 percent). Women who gave birth at home and at public health centers presented the highest percentage of more than one pregnancy in the period, but these women represent a small proportion of the sample. In public hospitals, 21 percent of women had more than one pregnancy in the period. This percentage is lower for women utilizing health insurance, as well as for those who gave birth at private hospitals.

The analysis of place and type of delivery of the last child suggests that the majority of women have vaginal births at public hospitals (49.2 percent), followed by women with cesarean sections at public hospitals (26.0 percent). While only 3.4 percent of women gave birth vaginally with their health insurance, 12 percent of women had cesarean sections utilizing this same coverage. Moreover, only 1.1 percent of women had vaginal births at private hospitals, and 6.8 percent had cesarean births at private hospitals. The highest percentages of sterilization were observed among women having a cesarean section: 31.4 percent at private hospitals; 23.9 percent at public hospitals; and 21.7 percent with health insurance. Women who had cesarean births had lower parity than the desired number of children in all categories of place of birth.

Table 3 illustrates the distribution of women by color/race, region of residence, years of schooling, marital status, and number of unions. The percentage of women sterilized does not vary greatly by color/race. The percentage of women with more than one pregnancy in the period is higher for the indigenous category 30.7 percent, although this group represents only 1.6 percent of women. Black (23.8 percent) and brown (21 percent) women have the highest levels of more than one pregnancy between 2001 and 2007. White and yellow women have the lowest parity, in comparison to their desired number of children. In terms of region of residence, women in the North (23.8 percent) Central-West (18.2 percent), and Northeast (17.4 percent) have the highest levels of sterilization. Women in the North and Northeast also have the highest percentages of more than one pregnancy in the period, as well as higher parity than their desired number of children.

>>> **Table 3** <<<

Considering educational attainment (Table 3), women with 0–3 years of schooling have the highest percentages of sterilization (24.6 percent). These women also have the highest percentage of more than one pregnancy in the period (28.7 percent). Women with 4–7 years of schooling also have a high percentage of more than one pregnancy in the period (23.9 percent). Women in the two lowest education groups have higher parity than the ideal number of children. In relation to marital status, 18.8 percent of married women are sterilized, while this rate equals to 14.8 percent among cohabiting women and 7.3 percent among women not participating in a union. The highest level of more than one pregnancy between 2001 and 2007 is observed among cohabiting women (24.5 percent). These cohabiting women also present higher parity than the desired number of children. Finally, women with at least two unions have the highest level of sterilization (22.5 percent), the highest level of more than one pregnancy in the period (26 percent), and higher parity than the ideal number of children.

A way to analyze the profile of sterilization in Brazil is through the cumulative percentage distribution of sterilized women by age at sterilization. This analysis can be done for each one of the variables investigated above. In terms of parity at delivery of the last child, Figure 1 illustrates that women with at least three children at birth have the highest sterilization rates. The difference between these women and those with two children increases, as the age at the moment of sterilization increases. The low cumulative percentage of sterilized women with one child (0.4 percent, shown in Table 1) decreases the overall cumulative percentage, which equals to 15.3 percent at 45 years of age. Women who had vaginal deliveries in the last birth have much lower cumulative sterilization percentages by age, compared to women who gave last birth by cesarean section (Figure 1). This difference starts to increase at age 25, and this difference reaches the level of 16 percent at age 45. The profile of sterilization can also be observed by analyzing place of delivery of the last child. Women at private hospitals have the highest cumulative sterilization percentages by age. Women who gave birth at public hospitals have cumulative sterilization percentages with almost the same profile as the mean of the country, due to the fact that they represent the highest percentage of women. Women who gave birth using health insurance have lower levels of sterilization than the overall mean until the age of 38. However, these women have an increase in their cumulative percentage of sterilization in older ages. The last graph in Figure 1 shows the trends of the cumulative sterilization percentages by interacting type and place of delivery of the last child. Women who had cesarean sections at private hospitals have the highest cumulative sterilization percentages, with higher rates than all the other groups beginning at age of 28. These women show even greater increases at the age of 33. Women who delivered by cesarean section at public hospitals have cumulative sterilization percentages higher than the country's mean

since the age of 25. Women who received cesarean sections using health insurance also have levels of sterilization higher than the overall mean, starting at age 38.

>>> **Figure 1** <<<

Figure 2 shows the cumulative percentage distribution of sterilized women by age at sterilization, color/race, region of residence, years of schooling, marital status, and number of unions. In terms of color/race, brown and indigenous women have the highest sterilization rates across all ages. However, the percentage of indigenous women is extremely small compared to the whole sample (1.6 percent, shown in Table 3). Information on region of residence indicates much higher cumulative sterilization percentages for residents in the North, followed by residents in the Central-West and Northeast. Women with the lowest educational attainment (0–3 years of schooling) also present high cumulative sterilization percentages across all ages, and lower sterilization rates as education increases. Married women have higher sterilization rates than the overall mean beginning at age 31, and the difference of their rates in relation to the other marital status increases with age. Women who are not in unions present the lowest sterilization rates starting at age 26. Finally, women with at least two unions have the highest cumulative sterilization percentages beginning at early ages. Women with one union have a profile close to the overall mean, due to their prevalent representation in the sample (78.1 percent, noted in Table 3). Women who were never in a union have the lowest sterilization rates across all ages.

>>> **Figure 2** <<<

Discussion

The findings might be providing evidence that women with the highest percentages of more than one pregnancy in the period (indigenous, black, or brown; residents in the North; 0–3 years of schooling; and at least two unions) also have the highest cumulative sterilization percentages. The only exception that arises is for marital status. Although the highest percentage of more than one pregnancy in the period is for cohabiting women, the highest cumulative sterilization percentages are for married women.

On one hand, women with high levels of sterilization, high percentages of more than one pregnancy between January 2001 and May 2007, and larger parity than the desired number of children tend to have the following characteristics:¹² high parity (three, four or more children); black, brown (who have not yet reached the desired number of children), or indigenous; residents in the North or Northeast regions; low levels of education (up to three years of schooling); and two or more unions. On the other hand, women with high levels of sterilization, low percentages of more than one pregnancy in the period, and lower parity than the desired number of children tend to have the following characteristics: cesarean section deliveries; birth using health insurance (“convênio”)

or direct out-of-pocket payments at private hospitals; and are married. More specifically, the cumulative percentage distributions of sterilized women by age at sterilization are indicating that sterilization is more associated with type of delivery than with place of delivery.

The empirical analysis is suggesting that a significant proportion of women might be getting sterilized after they reach the desired number of children, and that they have not been spacing out the timing of their births as much as unsterilized women.⁵ Moreover, women who gave birth at public hospitals have similar parity to their desired number of children. Women who delivered at private hospitals and those who used their health insurance have parity below the desired number of children. This might be a sign that these women did not yet reach their ideal number of children. However, the higher percentage of sterilization among women at private hospitals and those who used health insurance might cause lower parity than the ideal number in the long run.

One could argue that women are having forced sterilizations, which might cause regret following the procedure.^{5, 11, 21-27} However, sterilized women have greater parity than the ideal number of children. Data indicate that sterilization is higher among older women, women with higher parity, as well as in areas of the highest fertility rates (North and Northeast). The female sterilization rates are also high for women who have parity lower than the ideal number of children, among those with cesarean deliveries, births at private hospitals, and are married. Since sterilization is harder to get at the public sector, women might be going to the private sector in order to get this procedure, in conjunction with a cesarean delivery.^{28-33, 36}

The 1997 family planning law established restrictions for female sterilization in public hospitals for surgeries during cesarean deliveries, childbirth, and abortion. However, a large proportion of sterilization has been occurring using health insurance (“convênio”) or direct out-of-pocket payments at private hospitals. Female sterilization is also executed in combination with childbirth and cesarean section.^{1, 5, 33-37} The family planning law could be altered in order to allow female sterilization in conjunction with childbirth³², as a way to attend the demand of Brazilian women in public hospitals.

Furthermore, the high prevalence of sterilization in private institutions during cesarean sections should be a concern for the government. Policies are necessary not only to regulate the public sector, but also to aim better services at private institutions. The government has to implement family planning programs with appropriate health care, guidance, and access to sexual and reproductive health services for women.^{15-19, 27, 29, 36} Access to more options relating to modern contraceptive methods must be provided, as well as appropriate medical follow-ups, which would prevent women from facing the financial and emotional burdens by themselves.

Female sterilization should be discussed in the context of fertility below the replacement level, as one of its associated factors. Data indicate a high prevalence of sterilization among women

who have not yet reached their desired number of children. This finding might be an indication that the number of children ever born at the end of the reproductive period might stay below 2.1 children per woman, especially among sterilized women. Female sterilization is also important, because it is a permanent method, and its incidence has an effect on the use of other contraceptive methods. Further studies could analyze the factors associated with the decisions of women to use the different contraceptive methods. Models of competitive risks could be used to develop this type of analysis. Moreover, cohort studies could explore the differences in the prevalence of female sterilization among women born in different times.

Table 1. Distribution of women by sterilization situation, age at the moment of sterilization, and parity at the moment of last delivery, Brazil, January 2001 to May 2007.

Categories	Percent of women	Percent of sterilization	Percent of more than one pregnancy	Parity	Ideal number of children
Total	4,580	—	19.43	1.97	2.02
Sterilized	15.32	—	26.00	2.95	2.35
Not sterilized	84.68	—	18.24	1.80	1.96
Age at sterilization					
15–24	52.87	6.40	21.87	1.58	1.84
25–29	23.35	21.91	20.71	2.15	2.03
30–34	14.10	28.34	13.13	2.33	2.25
35–49	9.68	29.17	12.09	3.18	2.64
Parity at delivery					
1 child	44.66	0.41	0.00	1.00	1.79
2 children	30.70	20.24	34.36	2.00	2.04
3 children	15.99	35.47	34.60	3.00	2.28
4+ children	8.65	37.59	38.73	5.01	2.70

Source: 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS).

Table 2. Distribution of women by type and place of delivery, Brazil, January 2001 to May 2007.

Categories	Percent of women	Percent of sterilization	Percent of more than one pregnancy	Parity	Ideal number of children
Type of delivery					
Vaginal	55.14	7.91	22.68	2.11	1.98
Cesarean	44.86	24.42	15.44	1.81	2.07
Place of delivery					
At home	1.43	4.36	33.69	3.20	2.21
Public hospital (SUS)	75.21	13.83	21.03	2.03	2.01
Health insurance ("convênio")	15.36	17.16	15.09	1.69	2.03
Public health center	0.10	0.00	35.09	1.58	2.13
Private hospital	7.90	28.10	9.91	1.74	2.13
Place of vaginal delivery					
At home	1.43	4.36	33.69	3.20	2.21
Public hospital (SUS)	49.19	8.49	22.96	2.12	1.98
Health insurance ("convênio")	3.37	1.09	17.17	1.65	1.89
Public health center	0.05	0.00	67.87	2.02	2.40
Private hospital	1.11	7.97	10.51	1.71	1.97
Place of cesarean delivery					
At home	0.00	—	—	—	—
Public hospital (SUS)	26.02	23.92	17.37	1.87	2.05
Health insurance ("convênio")	12.00	21.67	14.50	1.70	2.06
Public health center	0.05	0.00	0.00	1.10	1.84
Private hospital	6.78	31.38	9.81	1.75	2.16

Note: Type of delivery and place of delivery relate to information from the last birth.

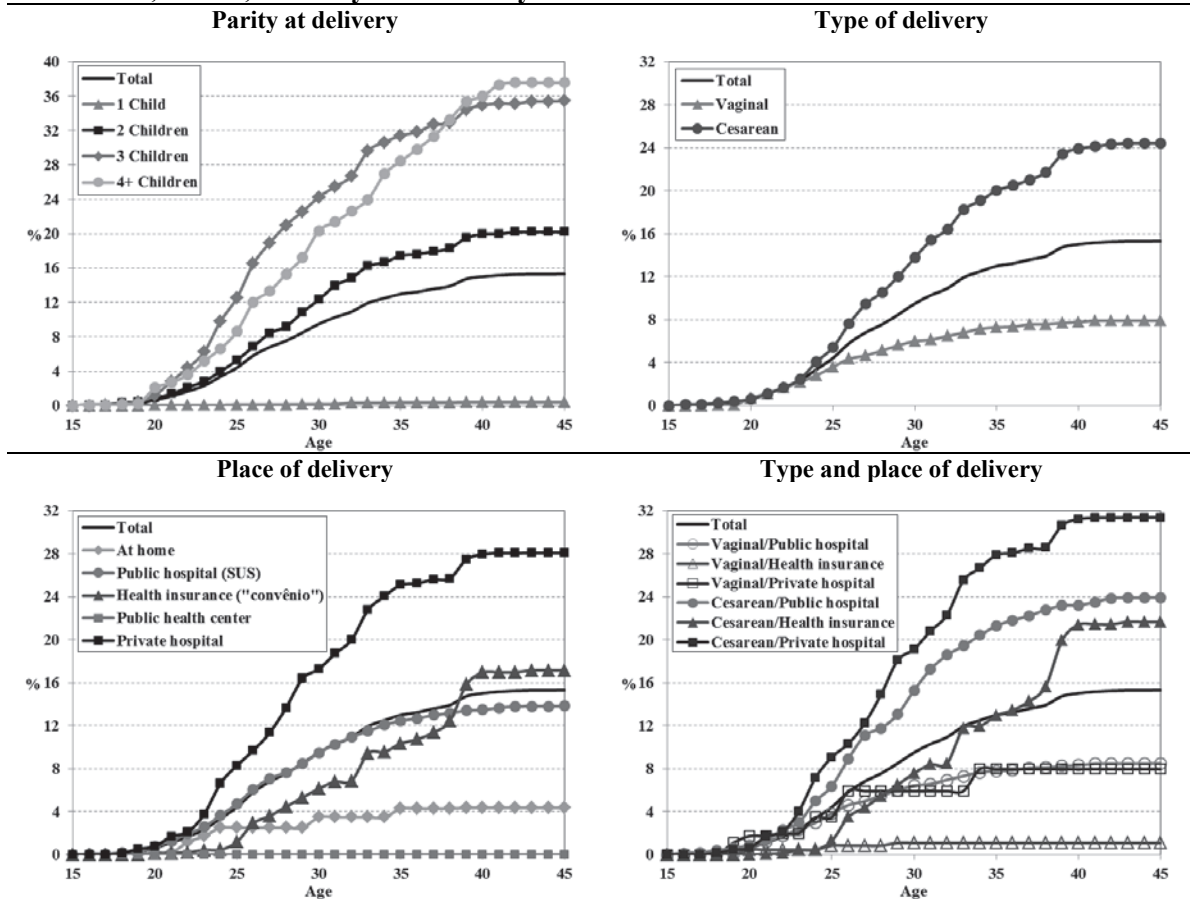
Source: 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS).

Table 3. Distribution of women by color/race, region of residence, years of schooling, marital status, and number of unions at the moment of interview, Brazil, January 2001 to May 2007.

Categories	Percent of women	Percent of sterilization	Percent of more than one pregnancy	Parity	Ideal number of children
Color/race					
White	35.65	13.68	15.59	1.88	2.03
Black	10.21	14.79	23.77	2.04	1.80
Brown (“parda”)	48.55	16.78	21.01	2.02	2.08
Yellow	3.97	12.28	18.80	1.73	1.81
Indigenous	1.62	18.22	30.68	2.71	2.15
Region of residence					
North	9.63	23.78	29.79	2.45	2.17
Northeast	27.71	17.35	24.02	2.06	2.00
Southeast	40.99	13.26	16.37	1.85	1.96
South	13.83	9.82	12.68	1.87	2.05
Central-West	7.84	18.21	18.40	1.92	2.19
Years of schooling					
0–3	10.92	24.59	28.71	3.04	2.35
4–7	29.54	16.24	23.94	2.25	1.99
8–10	26.66	12.34	19.47	1.75	1.94
11+	32.88	13.82	12.27	1.56	2.01
Marital status					
Married	40.82	18.80	15.06	1.94	2.17
Cohabiting	44.21	14.81	24.46	2.06	1.99
Not in union	14.97	7.33	16.51	1.80	1.71
Number of unions					
0	6.11	1.24	6.18	1.25	1.46
1	78.14	14.98	19.15	1.87	2.04
2+	15.75	22.48	26.00	2.76	2.15

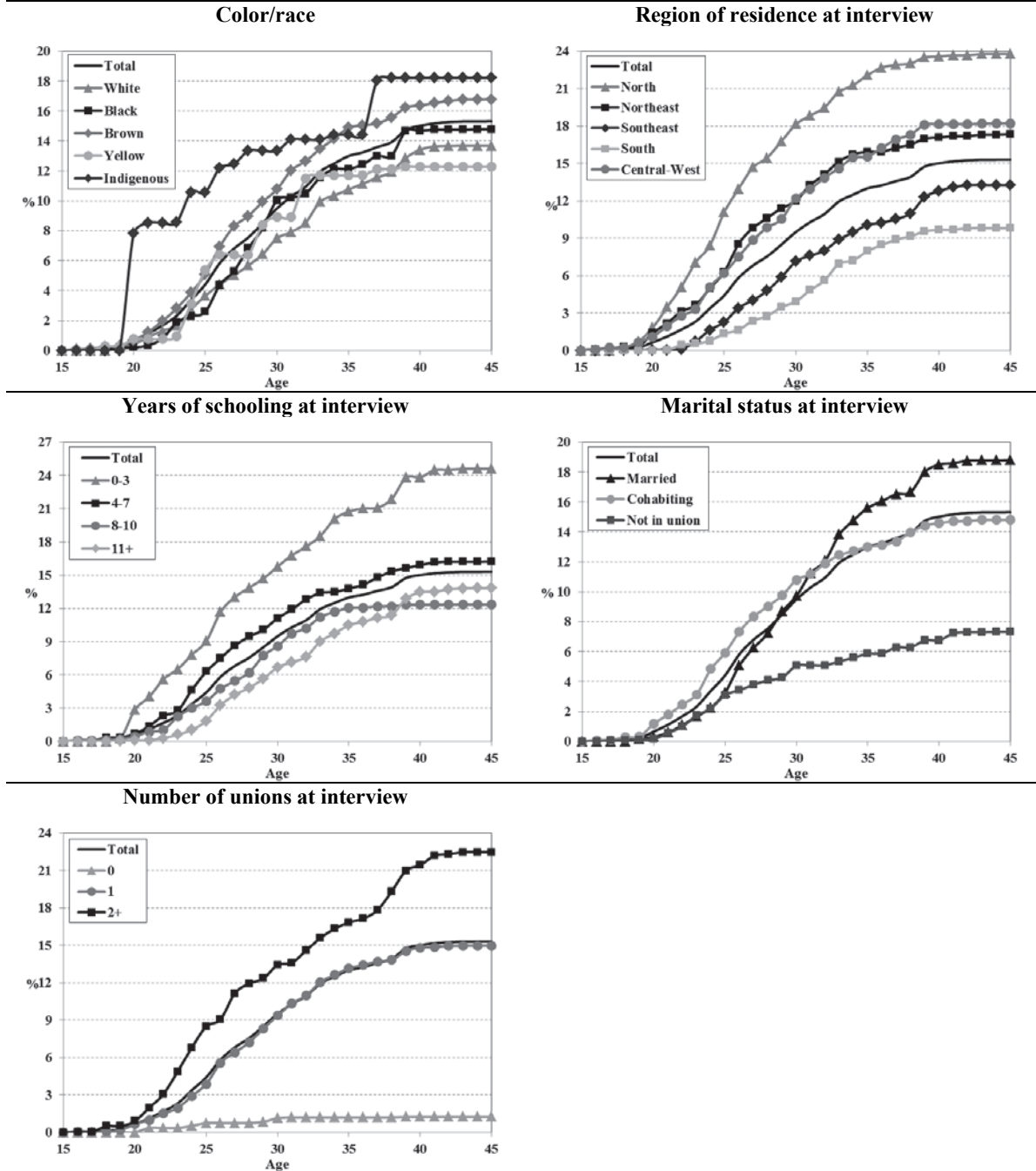
Source: 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS).

Figure 1. Cumulative percentage distribution of sterilized women by age at the moment of sterilization, Brazil, January 2001 to May 2007.



Note: Parity at delivery, type of delivery, and place of delivery relate to information from the last birth.
 Source: 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS).

Figure 2. Cumulative percentage distribution of sterilized women by age at the moment of sterilization, Brazil, January 2001 to May 2007.



Source: 2006 Brazilian National Survey on Demography and Health of Women and Children (PNDS).

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