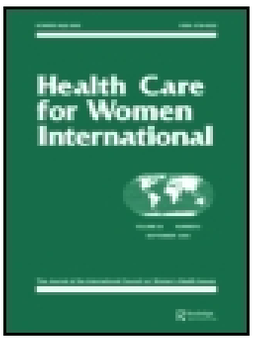

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Access to Contraceptives in Countries With Restrictive Abortion Laws: The Case of Brazil

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We aimed to determine whether current contraceptive use is affected by a history of abortion for women from a country with abortion-restricted laws. This is an analysis of 2006 Brazil Demographic and Health Survey. Nonpregnant women whose first pregnancy occurred in the previous 5 years were selected for this study (n = 2,181). We used propensity score matching to compare current contraceptive use among women with induced or spontaneous abortion and women with no abortion. We found differences in the use, but women with a history of abortion did not report more effective contraceptive than women with no abortion, as we expected.

Researchers suggest that the experience of an abortion may make women more likely to choose highly effective contraceptive methods (Madden, Secura, Allsworth, & Peipert, 2011; Tripney, Kwan, & Bird, 2013). In France, 54% of women undergoing induced abortion switched to a more effective

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method (Moreau, Trussell, Desfreres, & Bajos, 2010). At a clinical setting in the United States, women who were offered immediate postabortion contraception were more likely to choose a long-acting reversible method (LARC), such as the intrauterine device (IUD) and implant, than women without a recent abortion history (Madden et al., 2011). Results from intervention studies also show that family planning services offered for postabortion women can have positive effects on LARC use (Ceylan et al., 2009; Nobili, Piergrossi, Brusati, & Moja, 2007; Schunmann & Glasier, 2006).

The majority of those studies have been conducted in countries where abortion is legal and mostly available. Such data indicate that postabortion women in these studies could receive adequate postabortion family planning services, especially those where an intervention study took place. It still remains unclear, however, if this access situation can be replicated in other settings where restrictive abortion laws are adopted, which is the case for almost half of the countries in the world (Sedgh et al., 2008).

Brazil is one of these countries. The only three legal exceptions for legal abortion in the country are when the pregnancy is a result of sexual violence, a mother's life is in danger, or an anencephalic fetus is diagnosed. The Brazilian Ministry of Health launched guidelines for postabortion care in 2005 and revised them in 2011 in order to improve the quality of family planning services delivered to women who face an abortion, irrespective of whether it is spontaneous or induced (Ministry of Health Brazil, 2011). The avoidance of adverse consequences of unsafe abortions is one of the main challenges for policies aimed at improving maternal health in Brazil (Victora et al., 2011). Apart from this federal initiative, in a study conducted in three Brazilian Northeastern capital cities, researchers reported postabortion contraception care falls short of that advocated under Brazilian guidelines and by international agencies because less than 10% of women hospitalized were discharged with a contraceptive method prescribed (Aquino et al., 2012).

We wonder how postabortion women would choose their contraceptive methods in settings with poor postabortion family planning services. Considering recent findings, and even though laws and services delivery will vary, we hypothesize that Brazilian women with a history of abortion will have different contraceptive use patterns than women without a history of abortion, and also that they will use more effective methods. Thus our objective is to determine whether current contraceptive method use is influenced by the history of induced or spontaneous abortion among the women living in Brazil, where restrictive abortion laws are implemented.

METHOD

The present study is a secondary analysis of data from the Brazil 2006 Demographic and Health Survey (DHS). This is a nationally representative,

probabilistic sample survey of households and the resident women of reproductive age 15 to 49 conducted in two stages. The first stage involves the selection of primary sampling units that are the census tracks. The second involves the selection of secondary sampling units that are the households. For stratification purposes, 10 sampling strata are selected corresponding to a combination of all five regions (North, Northeast, Mid-west, Southeast and South), and urban and rural areas. From the 13,056 households initially selected, 17,411 eligible women aged 15–49 years are identified, and 15,575 eventually interviewed (11,062 from urban and 4,513 from rural households). Nonpregnant women whose first pregnancy occurred in the 5 years prior to the survey have been selected for the analytic sample for this study (n = 2,181).

To assess the differences in current contraceptive use among women with and without a history of recent abortion in an observational study, we use Propensity Score Matching (PSM). Introduced by Rosenbaum and Rubin (1983), PSM is a "method to reduce bias in the estimation of treatment effects with observational data sets." Although PSM has been in existence for many years, it is increasingly adopted to evaluate exposure. No evidence of its prior use was found to document the effect of an abortion (exposure) in the current contraceptive use (outcome).

This method is statistically valid and is particularly useful in observational studies, where the number of naturally occurring demographic and behavioral differences between the exposed and unexposed groups can be large, relative to the sample size (Rubin, 1997). It creates a comparison group that is also similar on average to participants in the exposed group (Rosenbaum & Rubin, 1983), such that the difference in outcome can be interpreted as due to the exposure. As women usually differ even in the absence of an abortion, we need to find, in a large group of women without abortion, those who are similar to women with an abortion on all relevant characteristics. With the application of PSM, the possible differences in current contraceptive use between the carefully selected unexposed group (women without abortion) and women with abortion (exposed group) can be attributed uniquely to abortion.

We defined abortion as both induced abortion and spontaneous abortion. In a country with abortion law restrictions, such as Brazil, many women who have had an induced abortion may have reported it as spontaneous. When analyzing this group, therefore, we have considered that it consists both of women who reported their abortion as an induced abortion and those who reported it as a spontaneous abortion or miscarriage. To examine this possibility, we compare the prevalence of induced abortions reported in Brazil 2006 DHS (2.3%) with the prevalence reported in the 2010 Brazilian Abortion Survey (15%; Diniz & Medeiros, 2010) and interpret the difference being due to significant underestimation of induced abortions reported by respondents in the DHS survey.

The women with a history of abortion are considered the exposed group. They are classified in two groups: women who have reported an induced abortion ($n = 38$) and women who have reported a spontaneous abortion ($n = 211$). All women with either type of abortion composed a third group just for PSM ($n = 249$). The 54 women who reported a stillbirth or ectopic pregnancy have been excluded. The unexposed group contains all women who did not report any abortion over the previous 5 years ($n = 1{,}878$).

The propensity score is constructed using a logit model to estimate the probability of exposure to an abortion on the basis of values for selected covariates—residence (urban, rural); region (North, Northeast, Midwest, Southeast, South); religion (Catholic, Protestant, other religion such as African or spiritualist, none); household wealth index (quintiles); female education (0–4 years, 5–8 years, 9–11 years, 12+ years); color (white, brown, black, others that are Indigenous and Asian); age at first sexual intercourse; interval of age from the first sexual relation to age at first pregnancy; interval of age from the first pregnancy to current age; marital status (married, unmarried); want more children (no, yes); health insurance (no, yes); work paid jobs (no, yes), and number of pregnancies.

The analyses are carried out using Stata 12.0. We first compare women's social, demographic, and reproductive characteristics using a chi-square test and simple linear regression, applying sample weights. Later, women with and women without a history of abortion are matched, with replacement, on their propensity scores according to a predefined maximum range, that is, the caliper width (here exposed and unexposed subjects are paired such that the difference in their propensity scores differs by no more than the caliper width). If a woman is not within a caliper's width of any other with an opposite exposure situation, then her information is dropped. The dependent variable is current contraceptive use. We measured current contraceptive use by questioning women, "Are you or your partner currently doing something or using any method to delay or avoid getting pregnant? Yes or no." If yes, we asked, "Which method are you using?" We then classified it in six groups: (a) use of any contraceptive method; (b) use of oral pill; (c) use of condom; (d) use of hormonal injectable; (e) use of traditional method (periodic abstinence or withdrawal); and (f) use of female sterilization. We did not consider the use of IUD or other LARC methods because these were not reported by women in our sample.

RESULTS

An analysis of Brazil's abortion rates and their associated factors based on the 2006 DHS data are described elsewhere (Camargo et al., 2011). Results from this study show that women with and without an abortion are different

in their sociodemographic characteristics according to the number of pregnancies, parity, desire for more children, color, and wealth index (Table 1).

The comparison of women with and without an abortion based on the PSM method is shown in Table 2. Women with a history of induced abortion report less use of the pill than women without abortion ($p = .009$) and more use of hormonal injectables ($p = .018$); women who have had a spontaneous abortion report less use of both pill and sterilization ($p = .002$ and $p = .026$, respectively) and more use of injectables ($p = .014$). Overall, women who report any abortion have less use of the pill ($p = .029$) and sterilization ($p = .008$) than women without an abortion. Current use of any method is somewhat higher among women with no abortion history after matching (78.1%) than among those with history of abortion (71.8%); the difference between the groups is marginally significant ($p = .069$).

Balance was achieved in all models. Such finding confirms that no statistically significant differences exist in any sociodemographic and reproductive characteristics after matching on the propensity score.

DISCUSSION

By considering the possible confounders that would interfere in the relationship between abortion and the use of contraception in constructing the propensity score, this study's findings confirm that the abortion, either spontaneous or induced, influences subsequent contraceptive use. This result is consistent with several studies demonstrating the women's trend to use effective methods after the occurrence of an abortion (Madden et al., 2011; Moreau et al., 2010). The type of contraceptives used by Brazilian women with an abortion, however, varies from those reported elsewhere: they use the pill less—and no LARC methods at all—compared with women without an abortion. That there was no report of LARC methods can be attributed to the limited availability and provision of these contraceptives at primary health care facilities (implants, hormonal IUD, patches, and vaginal rings are not available from the Brazilian Health System) rather than to women's actual choices, which clearly configures a gap in fully meeting their reproductive rights. On the other hand, pills and condoms are widely available for free in primary health care facilities and are easily purchased at any pharmacy without a medical prescription. The other reason why they are the most reported contraceptives in Brazil is because they do not rely on a health provider to be inserted or removed. Our study contributes to ensure the need to offer all safe and approved contraceptives to Brazilian women, so they can autonomously choose how to control their fertility. Naturally, the need for improving access to all contraceptives also applies for other countries with limited rights-based women's health programs, such as restrictions to abortion and family planning programs.

TABLE 1 Demographic Characteristics and Current Contraceptive Use of Brazilian Women According to History of Abortion in the Last 5 Years; Brazil 2006 DHS

	Abortion			
Variable	Induced $n = 38$	Spontaneous $n = 211$	No abortion $n = 1{,}878$	p
Age	23.7	25.0	24.3	.491
Age at first intercourse (years)	16.5	17.8	17.4	.186
Age at first method (years)	17.5	20.4	20.0	.716
Age at first pregnancy (years)	20.2	21.8	20.9	.356
Number of pregnancies	1.8	1.7	1.3	<.001
Parity	0.7	0.6	1.2	<.001
Pregnant before first contraception use (%)	14.1	10.7	11.7	.879
Want more children (%)	67.3	72.2	44.7	<.001
Education (%)				
0–4 years	12.5	8.9	12.5	.242
5–8 years	50.2	33.8	33.6	
9–11 years	19.4	51.5	46.5	
12+ years	17.3	5.7	7.4	
Religion (%)				
Catholic	72.5	57.1	61.9	.420
Protestant	7.9	24.7	24.5	
Other	–	3.6	3.2	
No religion	19.6	14.6	10.4	
Race (%)				
White	16.0	29.2	34.1	.019
Black	16.1	20.7	10.8	
Brown	43.4	44.0	48.0	
Other	24.5	6.1	7.0	
Marital status (%)				
Married	68.5	81.9	81.3	.429
Has health insurance (%)	20.5	20.4	23.9	.780
Urban (%)	88.1	82.8	82.5	.753
Region (%)				
North	16.8	10.4	7.8	.344
Northeast	33.5	24.0	27.4	
Southeast	40.9	43.6	43.3	
South	5.2	10.0	13.7	
Mid-west	3.6	11.9	7.9	
Wealth index (%)				
1st quintile	19.9	11.0	21.1	.016
2nd quintile	23.9	27.1	22.0	
3rd quintile	7.0	19.9	19.6	
4th quintile	2.6	22.3	18.6	
5th quintile	46.6	19.7	18.7	
Works a paid job (%)	33.2	36.3	36.4	.968

TABLE 2 Current Contraceptive Use of Brazilian Women by History of Abortion Before and After Propensity Score Selection of Women Without a History of Abortion; Brazil 2006 DHSF

	Before propensity score matching			After propensity score matching			
Current contraceptive use	Induced abortion % ($n = 38$)	No abortion % ($n = 1878$)	p	Induced abortion % ($n = 37$)	No abortion % ($n = 1846$)	p	Dif
Any method	65.7	83.5	.002	64.8	81.1	.057	−16.2
Pill	18.4	45.9	<.001	16.2	40.5	.009	−24.3
Condom	36.8	24.1	.035	35.1	29.7	.312	5.4
Injectable	10.5	8.2	.302	10.8	—	.018	10.8
Traditional	2.6	3.6	.371	2.7	2.7	.500	—
Sterilization	2.6	4.7	.271	2.7	10.8	.082	−8.1
Current contraceptive use	Spontaneous abortion % ($n = 211$)	No abortion % ($n = 1878$)	p	Spontaneous abortion % ($n = 178$)	No abortion % ($n = 1846$)	p	Dif
Any method	72.3	83.5	<.001	73.6	78.6	.131	−5.0
Pill	28.2	45.9	<.001	27.5	42.1	.002	−14.6
Condom	29.1	24.1	.056	32.0	26.4	.123	5.6
Injectable	11.2	8.2	.072	10.7	4.4	.014	6.2
Traditional	4.3	3.6	.298	4.5	1.7	.063	2.8
Sterilization	2.9	4.8	.113	2.8	7.3	.026	−4.5
Current contraceptive use	All losses % ($n = 249$)	No abortion % ($n = 1878$)	p	All losses % ($n = 206$)	No abortion % ($n = 1844$)	p	Dif
Any method	71.3	83.5	<.001	71.8	78.1	.069	−6.3
Pill	26.6	45.8	<.001	28.6	37.3	.029	−8.7
Condom	30.3	24.1	.017	31.5	25.7	.095	5.8
Injectable	11.1	8.1	.062	9.7	7.3	.189	2.4
Traditional	4.1	3.6	.359	4.4	2.9	.215	1.5
Sterilization	2.9	4.8	.090	1.9	6.8	.008	−4.9

In this study, it is possible that some women with a history of abortion have searched for a more effective contraceptive and found a hormonal injectable option better than the pill, but we cannot confirm this. Unlike other studies that compared contraceptive use with abortion (Madden et al., 2011), we cannot infer if the method women reported using is really their preferred method or just the one they can access.

In fact, the most frequently reported method by Brazilian women with abortion history is the condom, a method that differs from those found in a systematic review on postabortion family planning services in low-income countries—oral pills and the injectable (Tripney et al., 2013). The use of condoms in Brazil is promoted widely, especially among young persons (Berquó, Barbosa, & Pereira, 2008; Ministry of Health Brazil, 2008). Although there is no doubt that condom use is a desirable behavior from an HIV/AIDS prevention perspective, it is a short-term method that requires close user attention, with frequent failures and discontinuation.

Our hypothesis that women with an abortion have a different contraceptive use pattern from those without an abortion is not rejected, but women who reported an induced abortion did not use contraceptive methods more than the control group as we expected. Taking into consideration that Brazil's contraceptive prevalence rate is high—around 80% among married women (Brazil, 2008)—our findings show that the prevalence remained high, regardless of abortion history.

One of the study's limitations is the underestimated reporting of induced abortions in face-to-face survey interviews, with a possible overreporting on spontaneous abortion as a result. Our analysis has combined all these losses in an effort to account for the bias. Although the literature shows that a woman's motivation to adopt a highly effective method after an abortion can decrease over time (Madden et al., 2011), we are unable to assess the effect of the time because time of abortion was not ascertained. Another limitation inherent to studies using the PSM approach is that inference about an abortion's effects may be influenced by unobserved factors not included in the matching model. For example, we do not use information about partner relationship quality or about the partner's characteristics because only information on married women is available. Some measures are taken at the time of the survey and thus refer to a time after the history of abortion in the prior 5 years, such as marital status and reproductive intention, but the majority of the factors included in the logit model for constructing the propensity scores can be considered fixed over time.

Still, this study has analyzed nationally representative survey data that are comparable with those collected in many other countries around the world, where laws toward pregnancy termination are different. The investigative approach is robust because we are able to remove socioeconomic bias on contraceptive use and allow the independent effects of abor-

tion on subsequent contraceptive use to emerge in an attributable fashion. This approach is also very useful for future studies around sensitive reproductive health matters when it is unfeasible to randomly assign individuals, for example, to abortion, or even follow-up women with an abortion due to a country's legal restrictions. In that case, observational studies have to be used instead.

Our findings based on an observational study design in a country with restrictive abortion laws support the recommendation to improve the family planning programs supported on rights-based principals, in order to ease the access to both highly effective and long-acting contraceptive methods.

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