



## CLINICAL ARTICLE

## Severe maternal morbidity and factors associated with the occurrence of abortion in Brazil

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## ABSTRACT

**Objective:** To evaluate the reported occurrence of spontaneous and induced abortion, and abortion-associated severe maternal morbidity in Brazil. **Methods:** A secondary analysis of the 2006 Brazilian Demographic Health Survey was conducted. Interview data on women's experience of spontaneous/induced abortion and associated factors were analyzed overall and by geographic region. Multinomial logistic regression was performed to identify factors independently associated with abortion. The risk of associated severe maternal morbidity was estimated. **Results:** The reported lifetime rates of spontaneous and induced abortion were 13.3% and 2.3%, respectively, and were highest in the north (4.3%) and northeast (3.5%). The rate of spontaneous abortion was higher among women aged 40–49 years (odds ratio [OR] 1.15; 95% confidence interval [CI], 1.03–1.30) and among those with 0 or 1 children or delivery (OR 1.97; 95% CI, 1.36–2.85 vs OR 1.98; 95% CI, 1.37–2.86). Induced abortion was not associated with sociodemographic factors. Abortion significantly increased the risk of complications (hemorrhage and infection). **Conclusion:** Spontaneous abortion was significantly associated with parity and maternal age. Abortion in general carried a higher risk of severe maternal complications.

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## 1. Introduction

In countries in which abortion is illegal, the incidence of unsafe abortions reported in demographic studies is believed to represent only a fraction of the real number of unsafe procedures [1]. The majority of unsafe abortions tend to occur in low-income countries and in countries where the legislation is restrictive [2]. Of the approximately 600 000 maternal deaths worldwide recorded annually, 1 in 8 is estimated to be abortion-related [3]. In countries in which abortion is legal, abortion-related maternal deaths are rare [3]. By contrast, in Latin America and the Caribbean, 4.1 million induced abortions are believed to have occurred in 2003 alone [2]. The estimated rate of unsafe abortion in the region in 2003 was 29 cases per 1000 women aged 15–44 years [2].

In Brazil, abortion is legal only in cases of rape and risk of maternal death. More than 1 million induced abortions were estimated to have occurred in the country in 2005 [4]. The introduction of misoprostol as a method of abortion induction in Brazil in the 1990s was associated with a significant reduction in morbidity [5]. It is generally believed that the legalization of abortion has reduced the incidence of maternal mortality [6]. This is a strong argument for more research, an

improvement of maternal medical care, and a review of the legal status of abortion [1,7–11]. However, maternal death represents only a fraction of the problem—maternal morbidity has become a strategic new indicator of maternal health conditions [12,13]. To date, however, few data are available on the association between severe maternal morbidity and abortion [14].

In this respect, the Brazilian 2006 Demographic and Health Survey (DHS) [15] differed from previous surveys because it included information on severe maternal morbidity, based on a questionnaire specifically developed and validated for this purpose [16]. The aim of the present study was to evaluate the reported incidence of spontaneous and induced abortions in a sample of Brazilian women interviewed in the 2006 DHS and to investigate the incidence of severe maternal morbidity among pregnancies ending in abortion.

## 2. Materials and methods

The present study was a secondary analysis of data from the Brazilian 2006 DHS [15]. These data are currently in the public domain. The study was conducted in agreement with local ethical standards and was approved by the national review board.

The 2006 DHS comprised a probabilistic subsample of the 2005 National Household Survey, which was conducted in 5 regions of Brazil: south; southeast; midwest; northeast; and north. The sampling strategy involved 2 steps, with the census sectors comprising the

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primary sample units and individual households comprising secondary units. For stratification purposes, in the DHS, the census sectors were grouped according to their location (urban or rural area) within a given unit of the federal state. Because the 2005 Household Survey samples were not self-weighted, the DHS sampling strategy involved sample weighting.

The 2006 DHS [15] initially selected 13 056 households (9120 in urban areas and 3936 in rural areas). From these households, 17 411 eligible women aged 15–49 years were identified, 15 575 of whom were interviewed (11 062 from urban and 4513 from rural households). Losses to follow-up resulted mainly from refusal to participate (11% in urban areas and 9.4% in rural areas). The present study investigated the frequency of spontaneous and induced abortions during the lifetime of the interviewees and during the preceding 5 years (calculated from the date of the end of the pregnancy until the date of the interview). The analysis focusing on the preceding 5 years included 5500 pregnancies and 4340 women.

In the 2006 DHS, data on the experience of severe maternal morbidity were obtained via a previously validated questionnaire [16], with information on obstetric complications contributing to maternal deaths and selected indicator procedures serving as proxies of severe maternal morbidity [16]. Severe maternal morbidity was defined as the presence of a complication such as pre-eclampsia/eclampsia, hemorrhage, and infection, or the experience of any of the following: admission to an intensive care unit; blood transfusion; hysterectomy; transfer to a referral hospital; mechanical ventilation; or hospitalization for longer than 1 week.

The incidences of spontaneous and induced abortion were determined for Brazil as a whole and for each region. We then analyzed the correlation between sociodemographic factors and abortion status with bivariate and multivariate analysis. Multinomial logistic regression was performed to identify factors that were independently associated with spontaneous or induced abortion and to calculate the adjusted odds ratio (OR) and respective 95% confidence interval (CI). The dependent-variable categories chosen for the multinomial regression analysis were “no abortion,” “spontaneous abortion only,” and “induced abortion.” Eleven demographic factors—selected using backward elimination—were investigated as potential predictor variables. The results for each category of abortion are presented in relation to the reference category: “no abortion.”

Finally, the risk of severe maternal morbidity associated with abortion versus delivery was estimated by calculating the prevalence ratio and its 95% CI.

Throughout the statistical analysis, the characteristics (regional stratification, primary sampling unit, and sample weights) of the complex sampling plan of the DHS were taken into consideration. Statistical analyses were performed using SPSS version 17.0 (SPSS, Chicago, IL, USA) and Stata version 7.0 (StataCorp, College Station, TX, USA).

### 3. Results

In total, 2067 (13.3%) women declared having had a spontaneous abortion in their lifetime (Table 1), with the highest proportions occurring in the northeastern, northern, and midwestern regions: 497 (15.7%); 388 (15.0%); and 451 (14.3%), respectively. An induced abortion was reported by 358 (2.3%) women, with the highest proportion (111 [4.3%]) occurring in the north (Table 1). When only the women with at least 1 pregnancy in their lifetime were considered, 8393 (77.6%) had no abortions, 2067 (19.1%) had spontaneous abortions only, and 358 (3.3%) had induced abortions.

When the analysis was restricted to reproductive outcomes during the previous 5 years, the number of women who reported a spontaneous abortion was 437 (10.1%) (Table 1). The midwestern region had the highest rate, with 12.3% of cases. The percentage of induced abortions in the country as a whole was 1.8%; only the north and northeast had more than 2% of reported cases (Table 1).

Among the sociodemographic characteristics evaluated in the bivariate analysis, maternal age between 40 and 49 years was associated with a greater occurrence of spontaneous abortion (OR 1.15; 95% CI, 1.03–1.30) (Table 2). Women with no more than 1 living child (OR 1.97; 95% CI, 1.36–2.85) and those with a history of having delivered no more than 1 child (OR 1.98; 95% CI, 1.37–2.86) were also more likely to have had a spontaneous abortion. By contrast, the location of the household (rural or urban), education level, religion, skin color, marital status, the ideal number of children, employment, and income had no effect on the rate of spontaneous abortion. With regard to induced abortion, no statistically significant associations were found with any of these variables (Table 2).

In the multivariate analysis, parity, age, skin color, and religion were independently associated with spontaneous abortion (Table 3). None of the evaluated factors was independently associated with induced abortion.

Of the conditions that were considered to be indicative of severe maternal morbidity, only hemorrhage and infections were significantly more common in women whose pregnancies ended in abortion (either spontaneous or induced) than in women whose pregnancies ended in childbirth (Table 4). When all morbidity indicators were grouped together, the rate of severe maternal morbidity was also higher in the group of pregnancies that ended in abortion.

### 4. Discussion

The cumulative lifetime incidence of induced abortion in the present study was 23 per 1000 women interviewed, and 18 of 1000 women reported having had an induced abortion during the 5 years prior to the interview. For spontaneous abortion, there was a lifetime rate of 13.3% and a 5-year rate of 10.1%.

**Table 1**  
Abortion status by region in Brazil.

Abortion status	Region					
	North	Northeast	Southeast	South	Midwest	Total
<b>Lifetime status</b>						
Number of women	2587	3163	3340	3298	3154	15 542
Never was pregnant, %	25.2	30.4	32.1	30.4	25.0	30.4
Never aborted, % <sup>a</sup>	55.5	50.4	53.8	57.7	59.2	54.0
Spontaneous abortion, % <sup>b</sup>	15.0	15.7	12.2	11.1	14.3	13.3
Induced abortion, %	4.3	3.5	1.8	0.8	1.5	2.3
<b>Status during the past 5 years</b>						
Number of women	877	818	865	862	904	4326
Never aborted, % <sup>a</sup>	87.9	88.8	87.6	89.4	86.4	88.1
Spontaneous abortion, % <sup>b</sup>	9.9	8.9	10.5	10.1	12.3	10.1
Induced abortion, %	2.3	2.2	1.8	0.5	1.4	1.8

<sup>a</sup> Includes stillborn infants.

<sup>b</sup> Includes tubal pregnancies.

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