

# Determinants of abortion among women admitted to hospitals in Fortaleza, North Eastern Brazil

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- Background** Maternal mortality from complications of unsafe abortion constitutes a serious problem in several developing countries. There is, however, a paucity of well-designed and implemented studies in this area, especially in Latin America. The aim of this paper is to present the findings on the determinants and medical characteristics of abortions among women admitted to hospitals.
- Methods** A descriptive cross-sectional hospital-based study was carried out between October 1992 and September 1993 in Fortaleza, Brazil. A Cox's proportional hazard model was used to estimate prevalence rate ratios after adjustment for confounding.
- Results** Among 2074 (48%) women who admitted to terminating the pregnancy, 66% reported using misoprostol to induce abortion. Women with an induced abortion as compared with those with an unlikely induced abortion are younger, more often not married, have fewer children alive and experienced one or more previous induced abortions. We have not found any important differences with regard to complication or duration of stay in hospital.
- Conclusions** This finding, at odds with most previous studies, could reflect the special situation in Brazil where misoprostol is used for illegally-induced abortion. The use of misoprostol by this population may have contributed to the reduction of severe complications related to induced abortion which were most prevalent with more invasive methods. Recommendations are made as to the need for confirmatory studies as well as on information regarding cultural perceptions and concepts of abortion, and reasons why poor women fail to adopt available family planning methods.
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Illegal abortion is a major health problem affecting women's health in most developing countries.<sup>1</sup> Maternal mortality from complications of unsafe abortion constitutes a serious problem in several developing countries.<sup>2,3</sup> In Brazil, induced abortion is legally allowed only when necessary to save a woman's life or when pregnancy has occurred following rape. Despite this law, induced abortion is widely performed. It is estimated that

1.4 million illegally-induced abortions are performed every year in Brazil.<sup>1,4</sup> Fortaleza, our study site, is located in the impoverished Northeast of Brazil. It is the capital of Ceará State, with an estimated population of 2 000 000, over one-third of whom live in urban slums or 'favelas'.

It is reported that the misuse of abortifacient obtained from private pharmacies has become a popular practice. According to a study of sales of abortifacients over the counter in pharmacies in Fortaleza, misoprostol (Cytotec<sup>®</sup>) was offered to more than half (52%) of women seeking drugs for inducing abortion.<sup>5</sup> Misoprostol, a synthetic analogue of prostaglandin E<sub>1</sub> is registered for the treatment of gastric and duodenal ulcer. The drug has some uterine effect but its use alone is not considered to be highly effective in inducing abortion.<sup>6-8</sup> Congenital malformations have been reported in babies born to women exposed to

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misoprostol early in pregnancy in unsuccessful abortion attempts.<sup>9,10</sup> Since 1991 misoprostol sales have been suspended by law in Ceará State. There is, however, evidence that the drug has been widely available on the black market.<sup>11</sup>

This study was designed to assess the extent of morbidity due to abortion at the hospital level and identify risk factors that might suggest preventive measures. It will also gather information on contraceptive knowledge and practice of women who had induced abortion.

There are relatively few well designed and conducted studies involving women's reproductive health in developing countries. Thus, the findings and recommendations of the study will be of interest to the health authorities and institutions involved in women's health and abortion related issues in Brazil and other sites around the world.

## Methods

This study was conducted at the two largest public maternity hospitals in Fortaleza which mainly serve the urban poor population. There was an estimate of 13 740 births in the two hospitals during the study period. Three deaths (two sepsis, one severe haemorrhage) were recorded in the two study hospitals among women who had reportedly used misoprostol.

All women admitted to the two hospitals with a diagnosis of pregnancy loss from 1 October 1992 until 30 September 1993 were included. A total of 4416 women were interviewed during the study period. About 1.3% (57 women) were subsequently excluded, including 7 cases identified as therapeutic abortion, 21 cases diagnosed as having non-pregnancy related complications, 17 cases diagnosed as pregnancy related complications and 12 cases who left the hospital with pregnancy continuing.

Data were collected by interviewers from hospital records and patients using a structured questionnaire. Interviewers were university trained nurses or social workers with previous field experience in epidemiological research. Before the interview, the nature of the study was explained and consent to participate in the study was obtained. Interviews were conducted as privately as possible, and at times convenient for women during their hospital stay, and there were no refusals to participate in the study. Patients were interviewed about their sociodemographic backgrounds, reproductive histories, contraceptive practices, and characteristics of the abortion, including a detailed description of methods employed for inducing abortion. Interviewers also recorded detailed information about the woman's hospital experience including medical complications, hospital duration, and treatment. All cases were re-evaluated based on pre-established medical criteria and interviewers response, and were classified into four categories, according to a re-classification scheme:<sup>12</sup> (1) 'certainly' induced abortion when the woman admitted to terminating her pregnancy or signs were found on clinical examination of intervention such as cervical laceration, perforation or foreign bodies in the vagina or uterus; (2) 'probably' induced abortion when the woman did not report any attempt to terminate pregnancy but had signs of abortion accompanied by sepsis or peritonitis, and stated that the pregnancy was unplanned (either that she was using a contraceptive method during the cycle of conception or she was not using a contraceptive method because of reasons other than desired pregnancy); (3) cases were classified as 'possibly' induced

abortion if only one of the conditions listed under (2) above was present. All other cases were classified as 'spontaneous' abortions.

Standardized, pre-coded questions were used for most variables. The principal investigator and the research coordinator reviewed and coded all questionnaires. The data were entered onto an IBM-compatible micro-computer in Fortaleza, using Epi-Info 6.0.<sup>13</sup> Range and consistency checks were carried out for all variables and the data were cleaned and edited using Epi-Info 6.0 and Egret.<sup>14</sup>

A simplified scheme for a conceptual framework which shows the many inter-relationships between the different risk factors is presented in Figure 1. A new category, unlikely induced abortion, combined both the possibly induced and spontaneous abortion group. This will help with the identification of factors which, amongst a group of women hospitalized for abortion complications, distinguish the certainly induced from other types of abortion included in the unlikely induced abortion group. The outcomes studied are the type of abortion, namely certainly induced and unlikely induced abortion and a group of variables related to the medical characteristics. Initial analyses included simple tabulation of the frequency distribution of sociodemographic factors and reproductive factors according to the re-evaluated abortion status. In this cross-sectional study the prevalence rate ratio (PRR) is estimated in a manner similar to the estimation of the cumulative incidence ratio in cohort studies.<sup>15</sup> The  $\chi^2$  test was used to assess the strength of the association. Two-tailed significance tests were used. We examined whether there was a linear trend of increasing risk of induced abortion with increasing level of exposure, and if so whether there was any evidence of departure from linearity in this trend.<sup>16</sup> Cox's proportional hazard model was used to investigate whether the strength of the association found in the univariate analyses was significantly affected by the presence of any confounding variable. It has been reported that by assuming a constant risk period, the Cox model can be adapted to estimate PRR for cross-sectional data.<sup>17</sup> It has also been argued that the PRR gives better risk estimates than prevalence odds ratio (POR) in cross-sectional studies.<sup>18-20</sup> The multivariate analyses took into account the hierarchical relationships between the proposed risk factors.<sup>21</sup>

## Results

According to the reclassification of 4359 abortion cases, 48% of abortions were certainly induced, 40% were possibly induced, and 12% were spontaneous. In most cases classified as certainly induced (2074), women themselves have admitted to terminating the pregnancy. Only 10 cases were re-classified as certainly induced abortion from evidence of trauma or foreign body in the genital tract even though these women stated they had a spontaneous abortion. There were no cases classified as probably induced abortion.

The methods used to induce abortion among the 2084 study women classified as having certainly induced abortion were also studied. Two-thirds (1369) of the women reported inducing abortion with misoprostol alone or with another method. About one-third (705) of the women reported inducing abortion with other methods which included herbal medication, intramuscular injections and the insertion of a foreign body.

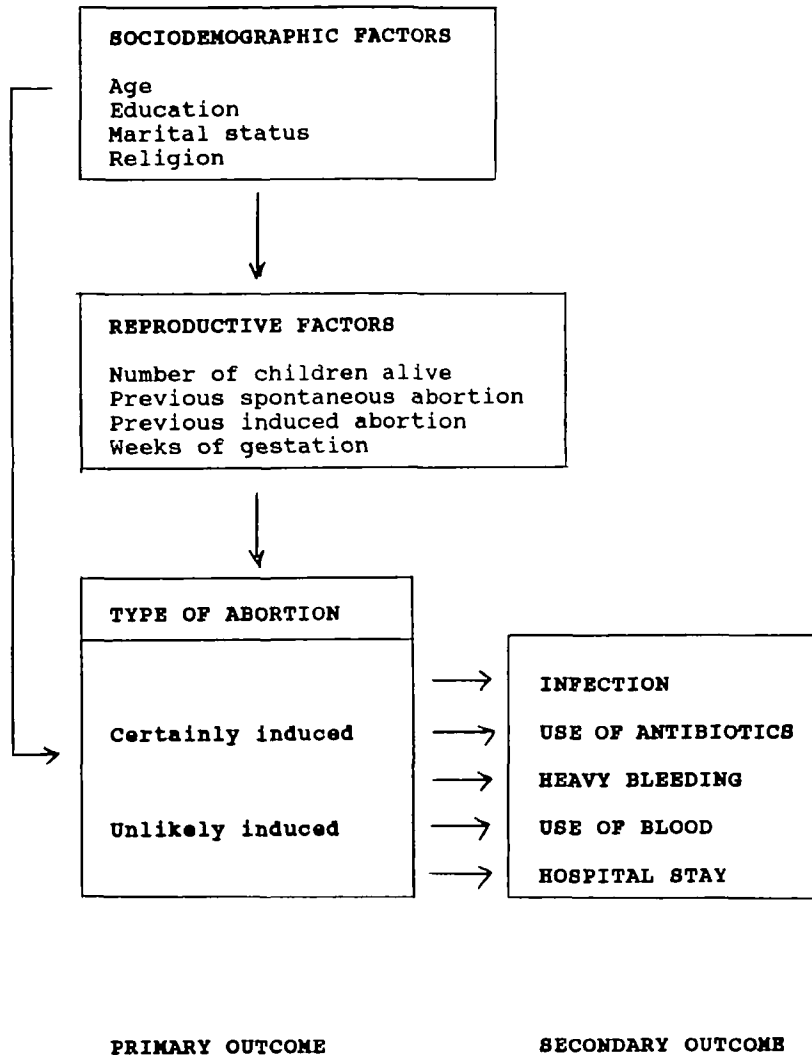


Figure 1 Simplified scheme of the conceptual framework

The study also collected information on the total dose of misoprostol reported taken by the women. Each tablet contains 200 µg of the drug. The women reported taking doses between 200 and 2400 µg, with a mean dose of 400 µg. Most women (1088) reported taking doses of two to four tablets both orally and vaginally (not in Tables).

Contraceptive use at the month of the conception for the 2084 certainly induced abortion cases is presented in Table 1. Most women did not use any contraceptive method. About 12% of women had used a birth-control pill, and only 5.3% reported use of condoms. The most frequent reasons cited for not using any contraceptive methods were careless (18.3%), did not expect to have sexual intercourse (13.8%), thought not to be at risk of pregnancy (13.8%) and fears of side effects (22.2%). Unavailability of contraceptive methods was reported by only 8%.

This section compares results between certainly induced and our newly introduced category unlikely induced groups. When adjusted for each other, the sociodemographic variables of age, education and marital status were found to be the best predictors

Table 1 Distribution of 2084 certainly induced abortion cases according to contraceptive method at the month of conception

Contraceptive method	No. (%) of women
None	1273 (61.1)
Oral contraceptive	256 (12.3)
Injectable contraceptive	36 (1.7)
Condom	111 (5.3)
Rhythm method	233 (11.2)
Withdrawal method	134 (6.4)
Others <sup>a</sup>	41 (2.0)

<sup>a</sup> Includes IUD, diaphragm, spermicide, etc.

of induced abortion status (or type of abortion) (Table 2). After such adjustment there was a highly significant linear trend suggesting an increased risk effect of decreasing woman's age. There was also a statistically significant linear trend with increasing years of education. Single women or women without

**Table 2** Distribution of 2084 certainly induced cases and 2275 unlikely induced cases according to sociodemographic and reproductive factors with corresponding prevalence rate ratios (PRR)

Risk factor	N	% certainly induced	PRR adjusted	95% CI
<b>Age (years)</b>				
≤19	807	58.5	1.53 <sup>a</sup>	1.24–1.88
20–24	1415	53.0	1.51 <sup>a</sup>	1.24–1.83
25–29	1067	46.2	1.47 <sup>a</sup>	1.21–1.79
30–34	599	40.4	1.38 <sup>a</sup>	1.10–1.71
35+	471	27.0	1.00	
Likelihood ratio (4 d.f.)				20.70 ( <i>P</i> < 0.001)
(trend 1 d.f.)				12.68 ( <i>P</i> < 0.001)
<b>Education (years)</b>				
None	244	36.9	1.00	
1–4	1310	44.0	1.06 <sup>b</sup>	0.85–1.33
5+	2805	50.5	1.18 <sup>b</sup>	0.95–1.47
Likelihood ratio (2 d.f.)				5.16 ( <i>P</i> = 0.07)
(trend 1 d.f.)				5.05 ( <i>P</i> = 0.03)
<b>Marital status</b>				
Married or stable union	2527	31.7	1.00	
Single, divorced or widow	1832	70.0	2.03 <sup>c</sup>	1.84–2.23
Likelihood ratio (1 df)				206.87 ( <i>P</i> < 0.001)
<b>Previous spontaneous abortion</b>				
0	3535	52.0	1.00	
1+	824	30.0	0.72 <sup>d</sup>	0.63–0.83
Likelihood ratio (1 d.f.)				22.81 ( <i>P</i> < 0.001)
<b>Previous induced abortion</b>				
0	3610	44.9	1.00	
1+	749	61.7	1.34 <sup>e</sup>	1.20–1.49
Likelihood ratio (1 d.f.)				27.65 ( <i>P</i> < 0.001)
<b>Gestation (weeks)</b>				
≤10	1806	53.0	1.35 <sup>f</sup>	1.16–1.57
11–12	1035	46.7	1.24 <sup>f</sup>	1.06–1.46
13–16	940	46.3	1.21 <sup>f</sup>	1.03–1.43
17+	578	36.1	1.00	
Likelihood ratio (3 d.f.)				17.33 ( <i>P</i> < 0.001)
(trend 1 d.f.)				15.56 ( <i>P</i> < 0.001)

<sup>a</sup> Adjusted for education and marital status.<sup>b</sup> Adjusted for age and marital status.<sup>c</sup> Adjusted for age and education.<sup>d</sup> Adjusted for age, education, marital status, number of children alive, induced abortion and gestation.<sup>e</sup> Adjusted for age, education, marital status, number of children alive, spontaneous abortion and gestation.<sup>f</sup> Adjusted for age, education, marital status, number of children alive, induced abortion and spontaneous abortion.

a partner were at 2.03 times higher risk of having induced abortion, compared with those who did live in a stable union. After inclusion of age and marital status in the regression model, the association between religion and occupation and type of abortion were no longer statistically significant (not in Table).

Table 2 also presents the adjusted analyses of the association between reproductive variables and induced abortion groups. Adjustment for confounding included age, education, marital status and each other variable. After such adjustment, number of children alive was no longer associated with the occurrence of induced abortion (not in Table). The women's report of

previous spontaneous abortion was associated with a 28% reduction in the risk of induced abortion. On the other hand, women having experienced previous induced abortion were at 1.34 times more risk of having induced abortion than those with no report of previous induced abortion. Women with ≤10 weeks of gestation admitted to hospital were at 1.35 times higher risk of having induced abortion compared with those who reported ≥17 weeks of gestational age.

Table 3 shows the adjusted analyses of the association between health and medical characteristics and type of abortion. Where there were signs of infection at admission, the risk of

**Table 3** Health and medical characteristics of 4359 cases of abortion according to type of abortion, with corresponding prevalence rate ratios (PRR)

Risk factor			PRR adjusted <sup>a</sup>	95% confidence interval
<b>Infection</b>	<b>Yes (%)</b>	<b>No (%)</b>		
Certainly induced	193 (9.3)	1891 (90.7)	1.43	1.12–1.82
Unlikely induced	130 (5.7)	2145 (94.3)	1.00	
Likelihood ratio (1 d.f.)				8.31 ( <i>P</i> = 0.004)
<b>Use of antibiotics</b>	<b>Yes (%)</b>	<b>No (%)</b>		
Certainly induced	429 (20.6)	1655 (79.4)	1.20	1.03–1.40
Unlikely induced	346 (15.2)	1929 (84.8)	1.00	
Likelihood ratio (1 d.f.)				5.26 ( <i>P</i> = 0.02)
<b>Heavy bleeding</b>	<b>Yes (%)</b>	<b>No (%)</b>		
Certainly induced	171 (8.3)	1912 (91.7)	0.79	0.64–0.97
Unlikely induced	266 (11.7)	2009 (88.3)	1.00	
Likelihood ratio (1 d.f.)				5.07 ( <i>P</i> = 0.02)

<sup>a</sup> Adjusted for age, education, marital status, number children alive, previous spontaneous abortion, previous induced abortion and gestational age.

induced abortion was 1.43 times higher for women with infection than for women with no signs of infection. As expected, the use of antibiotic remained associated with the abortion status.

Heavy bleeding, defined as vaginal bleeding at admission superior to menstrual blood flow, showed a negative association with induced abortion. A 21% reduction on the risk of heavy bleeding was found among women with induced abortion. These women were also at reduced risk (PRR = 0.93) of having blood transfusion but statistical significance was not reached (not in Table). Most women in both certainly induced (72.9%) and unlikely induced groups (74.3%) were admitted to the hospital for one or less days. Type of abortion was not found to be associated with hospital stay (not in Table).

## Discussion

Difficulty in obtaining information on illegal abortions has limited the number of studies carried out in developing countries. In addition to that, both the ethical issues and the logistic difficulties inherent in population-based studies have restricted most studies of abortion to a health facility. In hospital-based studies recruitment of a sufficient number of cases of abortion is relatively quick and easy to carry out. However, the lack of uniform criteria for abortion classification makes comparison between different studies difficult.

After controlling for several confounders, both women's age and marital status have clearly emerged as the most important risk factors in our population for the occurrence of complications related to induced abortion severe enough for women to be admitted to hospital. Of the sociodemographic variables, the higher proportion of women with young age and/or without a stable partner had been detected in some but not all studies of induced abortions.<sup>4,22–28</sup> The risk associated with higher levels of education, has been well recognized in recent studies carried out in urban settings in Brazil and in other Latin American countries.<sup>4,22</sup>

All but one reproductive variable studied were independently associated with the risk of induced abortion. After controlling for age and marital status the number of children alive was no

longer associated with induced abortion; a finding about which the literature has not been consistent.<sup>4,22,23,26–28</sup> However, most previous hospital-based studies have used different classification schemes and did not control for confounding which sometimes makes comparison between these studies and our study difficult. Our results also suggest that a previous experience of induced abortion increased the risk of subsequent induced abortion in women by about 40%. This was considerably higher than would have been expected from previous studies.<sup>4</sup> However, these studies did not disaggregate previous spontaneous abortion from induced abortion which would have biased their estimates toward unity. On the other hand, women who had experienced a previous spontaneous abortion were 42% less likely to have reported induced abortion than those who had not. This is in agreement with results of previous studies.<sup>4,26</sup> The mean gestational age of 11.4 weeks among women with induced abortion is rather lower than reported in previous studies in Brazil and other countries in Latin America.<sup>4,22,24</sup> A highly significant trend was observed for weeks of gestation after adjustment for potential confounders. Previous studies did not report on the risk associated with weeks of gestation.

Other major findings to emerge from this study that deserve particular attention are those related to the health and medical characteristics of women hospitalized due to abortion complications. After controlling for sociodemographic and reproductive variables, having induced abortion increased in approximately 40% the risk of infection. A similar pattern was seen for use of antibiotics. Surprisingly, more women in the unlikely induced group reported severe bleeding than women in the certainly induced group. Most women in the certainly induced group (94.3%) and unlikely induced group (94.9%) had dilation and curettage (D&C) only as a surgical procedure. The lack of association between hospital stay and with type of abortion is in contrast to most of the reports on this topic.<sup>4,28,30</sup> However, most of these studies did not present risk estimates and/or did not consider confounding. Most women in both certainly induced (94.4%) and unlikely induced (95.2%) received curettage and no women received a hysterectomy.

In our study, almost two-thirds of women classified as certainly induced abortion reported using misoprostol alone or in combination with other methods for inducing abortion. Most of these women have taken between 600 and 800 µg of the drug, orally and/or vaginally. These results confirm findings from two recent studies carried out in Brazil suggesting that misoprostol plays an important role as an abortifacient among poor urban women.<sup>11,22</sup>

Despite the greater severity of most outcomes among the women in the certainly induced group when compared with women in the unlikely induced group, these figures tend to indicate many fewer complications than those reported by previous studies.<sup>4,26,28-30</sup> A combination of two factors may explain the finding of lower abortion-related morbidity in our study population. First, misoprostol use was highly prevalent (66%) among women with induced abortion. Vaginal use of misoprostol is known to increase uterine activity in early pregnancy followed by vaginal bleeding within the first hour of drug administration.<sup>6-8</sup> Second, most of these women reported seeking medical care soon after they have some uterine effects mainly for inducing vaginal bleeding. It should be noted that our study reports on complications due to abortions admitted to the two largest obstetric services in Fortaleza which are likely to represent the most severe complications occurring in this population.

Most women were not using any contraceptive method at the time of conception. Rather worrying is the very small proportion of single women or those without a stable partner reporting use of condoms. Men need to understand the injuries sustained by women from their lack of condom use.

Information regarding cultural perceptions and concepts of abortion, and reasons why poor women fail to adopt available family planning methods are urgently needed to develop effective family planning campaigns.<sup>31,32</sup> A more ambitious goal for the prevention of unwanted pregnancy would be the introduction of an emergency contraception method. Emergency contraception, sometimes called post-coital or morning-after contraception, consists of methods that women can use after unprotected intercourse to prevent pregnancy. These include combined oral contraceptives given in a higher than normal dose, and the copper intrauterine device. These methods are known to be simple, safe, and effective, and have been used for decades in some countries.<sup>33,34</sup> However the full potential of emergency contraception has not been realized in many parts of the world, especially in developing countries. Wider use of the approach could reduce the number of induced abortions, and satisfied users may be good targets for subsequent contraceptive use.

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