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RESEARCH

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## HOSPITALIZATIONS AND HOSPITAL COSTS FOR SPONTANEOUS ABORTION IN BAHIA, BRAZIL

Internações e custos hospitalares por aborto espontâneo na Bahia, Brasil

Internaciones y costes hospitalarios por aborto espontáneo en Bahia, Brasil

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### ABSTRACT

**Objective:** To describe the cases of hospitalizations and hospital costs for spontaneous abortion in the state of *Bahia*, Brazil, in the period from 2011 to 2016. **Methods:** Epidemiological, cross-sectional and descriptive study based on secondary data from the Information Technology Department of the Unified Health System. The variables collected were: age groups, race and hospital costs. **Results:** It has registered 53.761 cases of hospitalizations. The greatest prevalence occurred in the east macro region (n=21.925), aged between 20 and 24 years old (n=11.943) and color/race brown (n=30.317). The hospital costs were 6.497.904,99 reais, and the year 2012 and the east macro region generated the greatest cost to the state. **Conclusion:** The study highlighted great prevalence of hospitalizations in *Bahia*. The analysis of that situation shows the need to give special attention to the problematic, mainly on the priority groups from east macro region of the state.

**Descriptors:** Epidemiology, Hospitalization, Women's health, Spontaneous abortion.

### RESUMO

**Objetivo:** Descrever os casos de internações e custos hospitalares por aborto espontâneo no estado da Bahia, Brasil no período de 2011 a 2016. **Métodos:** Estudo epidemiológico, descritivo e transversal baseado no banco de dados secundários do Departamento de Informática do Sistema Único de Saúde. As variáveis coletadas foram: faixa etária, raça/cor e custos hospitalares. **Resultados:** Foram registrados 53.761 casos de internações. A maior prevalência ocorreu na macrorregião leste (n=21.925), com faixa etária entre 20 e 24 anos (n=11.944) e cor/raça parda (n=30.319). Os custos hospitalares foram de R\$ 6.497.904,99 reais, sendo que o ano de 2012 e a macrorregião Leste geraram

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maior ônus ao estado. **Conclusão:** Evidenciou-se grande prevalência de internações na Bahia. A análise desse quadro retoma a necessidade de conceder atenção especial à problemática, principalmente nos grupos prioritários da macrorregião leste do estado.

**Descritores:** Epidemiologia, Hospitalização, Saúde da mulher, Aborto espontâneo, Custos de cuidados de saúde.

## RESUMÉN

**Objetivo:** Describir los casos de internaciones y costes hospitalarios por aborto espontáneo en el estado de la Bahía, Brasil, en el período 2011-2016. **Método:** Estudio epidemiológico, descriptivo y transversal, utilizando los datos obtenidos en lo Departamento de Informática del Sistema Único de Salud. Las variables recolectadas fueron: grupo de edad, raza y costes hospitalarios. **Resultados:** Se han registrados 53.761 casos de internaciones. La mayor prevalencia ocurrió en la macrorregión leste (n=21.925), grupo etario entre 20 y 24 años (n=11.944) y color/raza parda (n=30.319). Los costes hospitalarios fueron 6.497.904,99 reales, siendo que el año 2012 y la macrorregión leste han generado un mayor coste para el estado. **Conclusión:** Se evidenció gran prevalencia de internaciones en la Bahía. El análisis de este marco revela la necesidad de prestar una especial atención a la problemática principalmente en los grupos prioritarios del macrorregión leste del estado.

**Descriptores:** Epidemiología, Hospitalización, Salud de la Mujer, Aborto espontáneo.

## INTRODUCTION

According to the World Health Organization (WHO), abortion is defined as the either voluntary expulsion or not of a fetus until the twentieth week of gestation with the conceptual product weighing less than 500 g.<sup>1</sup> As it is one of the frequent complications during gestation, abortion is established worldwide as a major public health problem,<sup>2</sup> with about 97% of cases occurring in developing countries, where abortion is illegal.<sup>3</sup>

In Brazil, abortion is one of the four main causes of maternal death, showing a high mortality rate according to international standards.<sup>4</sup> Spontaneous Abortion (SA) is characterized when the expulsion of the fetus occurs without deliberate action<sup>5</sup> and affects about 10 to 15% of pregnancies<sup>6,7</sup> mainly during the first 13 weeks of gestation.<sup>8</sup>

The etiology of SA is heterogeneous and multifactorial. Among the main causes, genetic factors account up to 50% of cases (chromosomal and monogenic changes in the fetus); anatomical (uterine, cervical and/or placental anomalies); immunological; endocrine; environmental factors (smoking, drinking, infections, among others) and comorbidities.<sup>8,9</sup>

Although SA happens involuntarily, it is not risk free. Some complications such as hemorrhage, infectious processes, rupture of the uterine continuity, laceration of the uterine cervix, sterility, guilt, anxiety and depression might develop in women, and may progress to death.<sup>9</sup>

Considering the aforesaid, the epidemiological research addressing SA is essential for the dissemination of its

behavior and its financial impacts on Brazilian public health, to generate new hypotheses for the remodeling of public policies aimed at women's health. Hence, the objective of this study is to describe the cases of hospitalizations and hospital costs due to spontaneous abortion over the period from 2011 to 2016 in the Bahia State, Brazil.

## METHODS

It is a descriptive and cross-sectional study with an epidemiological approach, which was performed using data from hospital admissions and costs due to SA notified over the period from 2011 to 2016 in the *Bahia* State, Brazil.

The *Bahia* State is one of the federative units of Brazil, consisting of 417 municipalities<sup>10</sup> and 9 health macro-regions: Central-East, Central-North, Far South, East, Northeast, North, West, Southwest, and South. According to the *Instituto Brasileiro de Geografia e Estatística (IBGE)* [Brazilian Institute of Geography and Statistics],<sup>11</sup> The *Bahia* State has a demographic density of 24.82 inhabitants/km<sup>2</sup> and an estimated population of 15,344,447 inhabitants distributed over a territorial area of 564,732.45 km<sup>2</sup>.

Data were located and collected using the *Departamento de Informática do Sistema Único de Saúde (DATASUS)* [Information Technology Department of the Brazilian Unified Health System]. For the location, there were considered the cases that are classified in Chapter XV - Pregnancy, childbirth, and the puerperium (O00-O99) of the 10th International Classification of Diseases and Related Health Problems (ICD-10),<sup>12</sup> covering the pregnancy subcategory ending in abortion (O03.0 to O03.9). To outline the collection, the following variables were considered: age group, race/skin color, and hospital costs notified over the period from January 1st, 2011, to December 31st, 2016.

Data collection and tabulation were done in July 2017. Tabulation and descriptive analysis were performed using the Microsoft Office Excel program (Microsoft®, 2010). As this is an epidemiological study whose data are from a secondary source and in the public domain, there was no need for approval by the Research Ethics Committee, according to the Resolution No. 466/2012 from the National Health Council that address research involving human beings.

## RESULTS

When verifying the number of hospitalizations by macro-region and period, there is a larger morbidity in 2012 (n=12,472) and during those six years, the East macro-region presents the highest percentage of hospital admissions (40.78%), as shown in **Table 1**.

**Table 1** - Hospital admission due to spontaneous abortion and distributed by health macro-region and year of care provision. *Bahia* State, Brazil, 2011-2016.

Variable	2011	2012	2013	2014	2015	2016	TOTAL	%
<b>Hospital admission</b>								
Central-East	36	1.914	1.634	1.525	1.342	1.418	7.869	14,64
Central-North	4	272	98	89	102	137	702	1,31
Far South	18	236	184	156	182	176	952	1,77
East	137	5.380	4.586	4.561	3.847	3.414	21.925	40,78
Northeast	75	598	755	591	445	278	2.742	5,10
North	30	1.218	1.093	1.084	1.099	1.065	5.589	10,40
West	32	668	701	829	777	774	3.781	7,03
Southwest	104	1.130	1.110	1.236	1.115	850	5.545	10,31
South	134	1.056	792	815	968	891	4.656	8,66
<b>Total</b>	<b>570</b>	<b>12.472</b>	<b>10.953</b>	<b>10.886</b>	<b>9.877</b>	<b>9.003</b>	<b>53.761</b>	<b>100</b>

Source: Brazilian Ministry of Health - Hospital Information System from the SUS.

The average length of stay distributed by days in the hospital unit is described in **Table 2**, with an interval between 1.1 - 4.9 days.

**Table 2** - Average of stay length in hospital due to spontaneous abortion and distributed by health macro-region and year of care provision. *Bahia* State, Brazil, 2011-2016.

Variable	2011	2012	2013	2014	2015	2016	TOTAL
<b>Average of stay length</b>							
Central-East	1.7	1.8	1.8	1.8	1.9	1.9	1.8
Central-North	2.5	1.6	1.4	1.6	1.7	2.9	1.9
Far South	1.3	1.3	1.6	1.4	1.7	1.8	1.5
East	2.3	1.9	2.1	1.9	2	2	2
Northeast	4.9	1.8	1.7	1.6	1.6	2	1.8
North	1.6	1.6	1.6	1.6	1.7	1.7	1.6
West	2.4	1.7	1.7	2	1.8	1.9	1.9
Southwest	1.1	1.5	1.5	1.4	1.5	1.7	1.5
South	1.8	1.5	1.5	1.4	1.4	1.5	1.5
<b>Total</b>	<b>2.2</b>	<b>1.8</b>	<b>1.8</b>	<b>1.7</b>	<b>1.8</b>	<b>1.9</b>	<b>1.8</b>

Source: Brazilian Ministry of Health - Hospital Information System from the SUS.

Regarding the age group, it is observed that the interval between 20- and 24-year-old leads with 11,944 hospitalizations, corresponding to 22.22% of the total, as shown in Table 3. It is worth mentioning the significant occurrence of abortions among children under 14 years old and with age equal to or greater than 80 years old.

**Table 3** - Hospital admission due to spontaneous abortion and distributed by health macro-region and age group. *Bahia* State, Brazil, 2011-2016

Age (years old)	Central-East	Central-North	Far South	East	Northeast	North	West	Southwest	South	Total	%
1 to 4	1	-	-	1	-	-	-	-	-	2	0,00
10 to 14	118	15	24	339	53	112	48	81	87	877	1,63
15 to 19	1.280	153	178	3.047	472	1.098	705	857	856	8.646	16,08
20 to 24	1.733	156	258	4.686	553	1.335	863	1.224	1.136	11.944	22,22
25 to 29	1.684	156	214	4.956	580	1.220	825	1.264	1.007	11.906	22,15
30 to 34	1.484	113	140	4.576	524	903	691	1.054	873	10.358	19,27
35 to 39	1.028	69	96	3.019	369	617	445	671	471	6.785	12,62

Age (years old)	Central-East	Central-North	Far South	East	Northeast	North	West	Southwest	South	Total	%
40 to 44	473	31	30	1.138	170	272	187	341	201	2.843	5,29
45 to 49	66	9	10	150	18	31	14	46	24	368	0,68
50 to 54	1	-	1	11	2	1	2	4	1	23	0,04
55 to 59	-	-	1	2	-	-	1	2	-	6	0,01
60 to 64	1	-	-	-	-	-	-	-	-	1	0,00
65 to 69	-	-	-	-	-	-	-	1	-	1	0,00
≥80	-	-	-	-	1	-	-	-	-	1	0,00
<b>Total</b>	<b>7.869</b>	<b>702</b>	<b>952</b>	<b>21.925</b>	<b>2.742</b>	<b>5.589</b>	<b>3.781</b>	<b>5.545</b>	<b>4.656</b>	<b>53.761</b>	<b>100</b>

Source: Brazilian Ministry of Health - Hospital Information System from the SUS.  
 Note: Numeric data equal to 0 not resulting from rounding (-).

Considering the race/skin color variable shown in **Table 4**, there was a predominance of brown race/skin color with 30,319 cases, representing a percentage of 56.40%. Then, the variable 'no information' with 20,201 hospitalizations stood out. Such variable can be interpreted due to either underreporting or the lack of adequacy of the self-declaration to the options presented in the filling forms.

**Table 4** - Hospital admission due to spontaneous abortion and distributed by race/skin color. Bahia State, Brazil, 2011-2016.

Race/skin color	2011	2012	2013	2014	2015	2016	Total	%
White	16	564	335	326	285	248	1.774	3,30
Black	10	289	206	199	193	168	1.065	1,98
Brown	240	6.018	5.902	6.345	6.032	5.782	30.319	56,40
Yellow	-	17	24	58	123	176	398	0,74
Indian	-	-	1	1	1	1	4	0,01
No information	304	5.584	4.485	3.957	3.243	2.628	20.201	37,58
Total	570	12.472	10.953	10.886	9.877	9.003	53.761	100,00

Source: Brazilian Ministry of Health - Hospital Information System from the SUS.  
 Note: Numeric data equal to 0 not resulting from rounding (-).

**Table 5** addresses hospital costs in Brazilian Real (R\$) according to the macro-regions and period studied. It was noted that hospitalizations due to SA have a larger financial impact on the Brazilian health system. During those six years, the *Sistema Único de Saúde (SUS)* [Brazilian Unified Health System] spent a total of R\$ 6,497,904.99 on hospitalizations due to SA.

**Table 5** - Hospital costs due to spontaneous abortion and distributed by health macro-region and year of care provision. Bahia State, Brazil, 2011-2016.

Variable	2011	2012	2013	2014	2015	2016	TOTAL (R\$)	%
<b>Costs</b>								
Central-East	4.076,73	226.760,44	195.196,57	181.235,51	161.878,66	177.100,20	946.248,11	14,56
Central-North	502,02	33.453,08	11.104,49	9.985,41	11.398,53	15.827,75	82.271,28	1,27
Far South	2.022,18	26.333,16	21.742,19	17.985,52	21.949,71	21.467,25	111.500,01	1,72
East	17.446,07	641.689,77	559.233,29	541.511,93	484.824,69	430.608,55	2.675.314,30	41,17
Northeast	8.239,15	67.440,31	87.729,48	67.836,88	50.692,80	31.297,03	313.235,65	4,82
North	3.334,05	145.726,91	131.198,52	129.207,14	136.390,80	130.009,52	675.866,94	10,40
West	3.867,66	76.619,03	80.866,68	96.397,20	93.750,54	107.329,76	458.830,87	7,06
Southwest	11.999,31	136.614,15	135.673,96	153.326,05	145.027,51	106.455,86	689.096,84	10,60
South	17.111,66	122.311,43	91.478,64	95.550,49	111.697,22	107.391,55	545.540,99	8,40
<b>Total</b>	<b>68.598,83</b>	<b>1.476.948,28</b>	<b>1.314.223,82</b>	<b>1.293.036,13</b>	<b>1.217.610,46</b>	<b>1.127.487,47</b>	<b>6.497.904,99</b>	<b>100</b>

Source: Brazilian Ministry of Health - Hospital Information System from the SUS.

Concerning the individual average hospitalization value, Table 6 shows variations of R\$ 180.27 and R\$ 212.75. During the period studied, the Southwest macro-region stood out with the highest average spending.

**Table 6** - Average value of hospital admission due to spontaneous abortion and distributed by health macro-region and year of care provision. *Bahia* State, Brazil, 2011-2016.

Variable	2011	2012	2013	2014	2015	2016	TOTAL (R\$)
<b>Average value/Hospital admission</b>							
Central-East	183.97	189.83	191.01	190.2	192.27	197.77	191.97
Central-North	195.92	194.18	183.11	181.35	181.85	185.85	187.6
Far South	182.75	180.8	189.29	183.89	190.27	193.5	187.14
East	200.07	190.42	193.29	189.87	198.78	198.73	193.73
Northeast	180.27	183.21	186.61	184.89	184.58	183.58	184.69
North	181.67	190.4	190.91	190.09	195.54	193.21	191.94
West	191.64	185.31	186.18	186.36	191.29	212.75	192.59
Southwest	185.83	191.4	192.66	194.66	202.13	195.36	195.04
South	198.11	186.4	185.99	187.74	185.33	191.04	187.57
<b>Total</b>	<b>191.37</b>	<b>189.36</b>	<b>191.04</b>	<b>189.63</b>	<b>195.04</b>	<b>197.28</b>	<b>192.15</b>

Source: Brazilian Ministry of Health - Hospital Information System from the SUS.

## DISCUSSION

The study aims to collaborate for the compression of the theme and its repercussions, as well as assist in the design of actions, which act in the prevention of the aspects that stimulate the SA and promote the assistance to patients. Furthermore, it seeks to verify the local epidemiological profile status concerning the impairment of the fetus loss, contributing to the association of data and further scientific research addressing the topic.

Observing the results obtained, there was a predominance of pregnancy discontinuity due to SA in the East macro-region of *Bahia* State (Table 1), corresponding to 40.78% (n=21,925), a fact that demonstrates the need to focus on measures of assistance to pregnant women through public management in the region. However, barriers are still found for the reliable measurement of the problem of SA, since, due to the mixture that occurred with other forms of abortion, there is indistinction between many cases.<sup>13</sup>

Among the motivating factors for this context, low adherence to prenatal care is considered, since it is attributed to this, when performed improperly, influence on the complication rates and even fetal and/or maternal death.<sup>14</sup> So, assistance to the mother-child binomial is an important action, which aims to mitigate the worsening health of both, as well as to prevent problems in the development of the fetus, prematurity or loss of the fetus,<sup>15</sup> thus assuming a role indispensable during gestation.

Nevertheless, there are also studies showing possible causes linked to the pregnant woman's socioeconomic environment, such as previous contamination with Sexually Transmitted Infections (STIs).<sup>9</sup> Among these, the frequent rate of various infections, maternal age, autoimmune diseases, life habits and too much consumption of narcotics are strongly associated with fetal loss.<sup>16</sup> Accordingly, the quality of life and health of the mother directly reflects on

the fetal and pregnancy condition, which might contribute to SA susceptibility.

Despite this, the great causal variety for the abortion phenomenon still leaves gaps for the elucidation of the problem, so that half of the cases have not identified its etiology during the diagnosis.<sup>5</sup> Therefore, further studies are extremely important. For a better analysis of the regional panorama, as well as the encouragement of healthy life practices, the frequent consultation with the doctor and prevention of pathologies, minimizing, mainly, the probability of complications and vulnerability to the morbidity and mortality of the pregnant woman and the embryo.

When variables such as the stay length due to SA are emphasized, data are found (Table 2) that corroborate the affirmation of the predominance of cases in the East macro-region. However, there are noticeable variations in stay between 1.5 to 4.9 days of hospitalization, resulting from the need to check the patient's health and remove the remains of abortion. Accordingly, uterine curettage is one of the most common methods,<sup>13</sup> although there are other forms of surgical, clinical, or observational interventions.<sup>17</sup>

Concerning hospitalizations not stratified by age group, the supremacy of the occurrences of abortion in the range of 20 to 24 years old was identified, meaning 22.22% of the records (11,944), as shown in Table 3. This situation promotes the investigation of characteristics women in common, which correlate with the gestational period and interfere with the embryo's life. In this sense, and under the aspect of fertility, it is widely reported in the literature that the most productive female age group is in the range of 15 to 49 years old in general, and in the Brazilian population, from 10 years of age.<sup>18</sup>

Thus, when this information is related to the beginning of sexual practice at around 14.8 years old<sup>19</sup> and the

physiological changes caused by menopause beginning between 40 and 55 years old,<sup>20</sup> the propitious scenario for a higher incidence of pregnancy and propensity to SA events come about. Therefore, it is visible that the female organic aspects collaborate to increase the number of cases of fetal losses in the youth phase when there is exposure to factors that make abortion viable.

Nonetheless, it is still noteworthy, a significant portion of SA between 40 and 44 years old, as shown in **Table 3**. This event may be related to complications generated due to late pregnancy, which are caused by gestational risks motivated by systemic aging and a higher frequency of pathological events as the age advance.<sup>21</sup> So, there is an increase in the probability of SA in women over 35 years old, as well as damage to the embryo, morphophysiological and genetic changes, in addition to fetal and maternal death.<sup>22</sup>

On the other hand, when investigating the contingency of hospitalizations distinguished by racial identification, attention is drawn to the fact that the significant concentration of records of brown people, followed by the unreported category, corresponding to 56.34% (n=30,319) and 37, 58% (n=20,201), respectively, as shown in **Table 4**. As a motivation for this circumstance, it is suggested that the result found is influenced by the ethnic-racial composition of the *Bahia* State, since among its population diversity, the State accounted for 30.13% (4,222,717 women) of the self-declared brown female population in the last Brazilian Demographic Census, dated 2010.<sup>23</sup>

Moreover, the subjectivity of racial cataloging carried out in demographic censuses is also added to this episode, which contributes to the identification of the characteristics of the population. From this perspective, there is the context of the existence of gaps in the indexing of true information, for instance, caused by changes in the parameters of data collection and analysis over the years, as well as the appearance of the brown race/skin color category as resulting from the intermediation between the black and white races, thus promoting difficulties in racial self-declaration.<sup>24</sup>

Based on the above-mentioned, the representative interference of the predisposition to the SA event interlaced with racial issues is also worth mentioning. Hence, it is notable that the involvement of abortion occurs more assiduously in women who have a race/skin color different from white, among other characteristics.<sup>25</sup> Therefore, it is possible to consider that the phenotypic and hereditary characteristics of the pregnant woman act in accordance with the elements that favor the triggering of abortion phenomena.

As for the amount charged in hospitalizations for abortion, there is a lack and outdated studies assigned to the SA. Given this, the reality of the scarcity of research on the expenses generated, often derives from the multiple characteristics contemplated in each case, their repercussions and the particularity of each patient, making cost analysis difficult.<sup>26</sup> So, the interpretation of data is

based on the identification of existing needs in general, which requires the use of funds.

Nevertheless, considering the effects of fetal losses, it is assumed that the high computed cost is established as a result of using procedures to control, prevent and treat the conditions present in the patient, since the SA culminates in a situation of vulnerability to women.<sup>27</sup> Additionally, the high demand for hospitalizations, added to the verification of complications in the chart, promotes an increase in the final amount<sup>4</sup> used by the health system, a situation represented in the data expressed in the study results (**Table 5**).

Furthermore, concerning these findings, the prevalence of the average value in the hospital environment is also seen, which indicates the average individual costs in the range of R\$ 180.27 and R\$ 212.75 (**Table 6**). Consequently, these alternations in expenses can be explained by the distinctions observed in the Hospitalization Authorization, which encompasses hospital and professional services, providing their respective values.<sup>28</sup> Therefore, the rates expressed the technical-hospital contribution provided to patient care, according to indispensability and convenience.

## CONCLUSION

Herein, there was verified a large number of hospital admissions due to SA in the *Bahia* State between 2011 and 2016 (n=53,761), and the East macro-region showed the higher number of hospitalizations (n=21,925). There was a predominance of people within the age group from 20 to 24 years old (n=11,944) and self-declared brown race/skin color (n=30,319). Concerning the financial impact, the SA generated a burden of more than R\$ 6 million with R\$ 192.15 as average value of hospital admission and 1.8 days as average of stay length.

The analysis of this situation resumes the need to pay attention to the problem, mainly in the East macro-region of the State, making it possible to understand the complications faced during pregnancy and, consequently, the damage caused to the gestational health condition, since the abortion, in its entirety, does harm the woman's living conditions.

Bearing in mind the study's design, there is a limitation regarding the source of the data collected, since they might contain underreporting, and therefore, inconsistency in the records. Hence, it is not possible to perform the generalization of results.

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