

## CHARACTERIZATION OF MATERNAL DEATHS IN THREE HEALTHCARE REGIONS OF THE CENTER-NORTH OF BAHIA

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**ABSTRACT:** The present study aimed to describe the epidemiological profile of maternal mortality in the cities that constitute the 15th, 16th and 28th Regional Health Boards – Bahia, occurred between 2006 and 2012. Cross-sectional study with secondary data from 113 maternal deaths recorded in the Mortality Information System, conducted from July to September 2013. Deaths were more prevalent among black women aged 20-29 years old, with 4 to 7 years of education, living without a partner, who had 1 to 4 pregnancies; 4 to 6 prenatal appointments, started prenatal care up to the 1st trimester of the pregnancy. The deaths occurred mainly in the postpartum period (up to 42 days). The results showed that maternal mortality is not only a public health problem: it is also a social issue. The knowledge provided by this study may help managers, health workers and the society to develop joint public policies and implement strategies aimed to reduce the number of maternal deaths in the region.

**DESCRIPTORS:** Maternal mortality; Information systems; Women's health; Public health.

### CARACTERIZAÇÃO DOS ÓBITOS MATERNOS EM TRÊS REGIÕES DE SAÚDE DO CENTRO-NORTE BAIANO

**RESUMO:** Objetivou-se descrever o perfil epidemiológico da mortalidade materna nos municípios que fazem parte da 15ª, 16ª e 28ª Diretoria Regional de Saúde - Bahia, ocorridos entre os anos de 2006 e 2012. Trata-se de um estudo transversal, com dados secundários dos 113 óbitos maternos registrados no Sistema de Informação sobre Mortalidade, realizado de julho a setembro de 2013. Prevaleram os óbitos em mulheres: entre 20-29 anos; raça negra; 4 a 7 anos de estudo; sem companheiro; tiveram entre 1 e 4 gestações; realizaram 4 a 6 consultas pré-natal, iniciaram pré-natal até o 1º trimestre; ocorrendo principalmente no puerpério (até 42 dias). Os resultados mostram que a mortalidade materna não é apenas um problema de saúde pública, mas uma questão social. O conhecimento deste estudo pode contribuir para que gestores, trabalhadores de saúde e sociedade estruturarem conjuntamente políticas públicas e implementem estratégias para reduzir o número de óbitos maternos na região.

**DESCRIPTORIOS:** Mortalidade materna; Sistemas de informação; Saúde da mulher; Saúde pública.

### CARACTERIZACIÓN DE LOS ÓBITOS MATERNOS EN TRES REGIONES DE SALUD DE CENTRO-NORTE DE BAHIA

**RESUMEN:** Fue objetivo del estudio describir el perfil epidemiológico de la mortalidad materna en municipios que integran la 15ª, 16ª y 28ª "Junta Directiva Regional de Salud" – Bahia, entre los años de 2006 y 2012. Es un estudio transversal, con datos secundarios de 113 óbitos maternos registrados en el Sistema de Información sobre Mortalidad, realizado de julio a septiembre de 2013. Prevalcieron los óbitos en mujeres: entre 20 y 29 años; de raza negra; 4 a 7 años de estudio; sin compañero; que tuvieron entre 1 y 4 gestaciones; realizaron 4 a 6 consultas de prenatal, empezaron prenatal hasta el 1º trimestre; que ocurrieron principalmente en el puerperio (hasta 42 días). Los resultados muestran que la mortalidad materna no es solamente un problema de salud pública, sino una cuestión social. El conocimiento de este estudio puede contribuir para que gestores, trabajadores de salud y sociedad estructuren conjuntamente políticas públicas así como implementen estrategias para reducir el número de óbitos maternos en la región.

**DESCRIPTORIOS:** Mortalidad materna; Sistemas de información; Salud de la mujer; Salud pública.

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## ● INTRODUCTION

Maternal mortality is a serious public health issue, with high rates in several countries. In 2011, there were approximately 273,000 maternal deaths all around the world<sup>(1)</sup>.

Maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Late maternal deaths are deaths caused by direct or indirect obstetric causes more than 42 days but less than one year after the termination of pregnancy<sup>(2)</sup>.

Maternal mortality rates are high in Brazil. In 2011, the Maternal Mortality Ratio (MMR) was 63.9 deaths per 100,000 live births<sup>(3)</sup> and in the state of Bahia, in that same year, this indicator reached 87.9 deaths per 100,000 live births<sup>(4)</sup>, worrisome data, since maternal mortality is defined as low when MMR is not higher than 20 deaths per 100 thousand live births and high maternal mortality occurs when there are more than 50 deaths per 100,000 live births<sup>(5)</sup>.

Notification and, particularly, investigation of maternal deaths on a timely basis, and correct completion of information are essential to monitor maternal mortality, as well as to the accurate quantification of these deaths, knowledge of the profile of these women and the type of care provided, which is essential to design and implement measures aimed to the prevention of further cases<sup>(5-7)</sup>.

In the analysis of maternal deaths in the context of socioeconomic and demographic inequalities, some risk factors deserve are highlighted, as follows: advanced maternal age, low educational level and black color/race<sup>(8,9)</sup>. Obstetric characteristics such as failure to attend prenatal care (PN) or few prenatal appointments and cesarean sections are also associated to maternal mortality<sup>(8)</sup>.

Knowledge of the aspects related to maternal deaths based on the characterization of demographic, gynecological and obstetric factors and description of the time of death may help identify the population groups that are most vulnerable to maternal mortality. Such understanding is essential for the development of public policies and the implementation of interventions aimed to reduce the number of maternal deaths.

For the characterization of this public health issue, the following guiding question is proposed for the development of this study: What is the epidemiological profile of maternal mortality in the cities that constitute the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> Regional Health Boards (DIREs)-BA, between 2006 and 2012?

Therefore, the present study aimed to describe the epidemiological profile of maternal mortality in the cities that constitute the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> Regional Health Boards (DIREs-BA) occurred between 2006 and 2012.

## ● METHOD

Descriptive, cross-sectional study that uses secondary data, including all the 113 maternal deaths recorded at the Mortality Information System (SIM/MS) through Death Certificates (DO) and Records of Investigation (FI), occurred between 2006 and 2012 in the cities that constitute the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> Regional Health Boards (DIREs) of the state of Bahia. The reasons for selecting years 2006 and 2012 are as follows: the year 2006 was the initial period of investigation of maternal deaths and the year 2012 was the most recent period with complete data.

The study locations were 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> Regional Health Boards (DIREs), located in the cities of Juazeiro, Jacobina and Senhor do Bonfim, respectively, comprising 37 cities of Bahia, in the Centre-North mesoregion of the state. Of these, 9 belong to the 15<sup>th</sup> DIREs (Campo Alegre de Lourdes, Casa Nova, Curaçá, Juazeiro, Pilão Arcado, Remanso, Sento Sé, Sobradinho and Uauá), 19 to the 16<sup>th</sup> DIREs (Caém, Caldeirão Grande, Capim Grosso, Jacobina, Mairi, Miguel Calmon, Mirangaba, Morro Do Chapéu, Orolândia, Piritiba, Quixabeira, São José do Jacuípe, Saúde, Serrolândia, Tapiramutá, Umburanas, Várzea Da Roça, Várzea Do Poço, Várzea Nova) and 9 constitute the 28<sup>th</sup> DIREs (Andorinha,

Antônio Gonçalves, Campo Formoso, Filadélfia, Itiúba, Jaguarari, Pindobaçú, Ponto Novo and Senhor do Bonfim), which have 1,152,382 inhabitants<sup>(10-12)</sup>.

The inclusion criteria were deaths of women of any age during pregnancy or at childbirth related to abortion, occurred during the postpartum period within 42 days after pregnancy termination or less than one year after termination of pregnancy (late maternal death)<sup>(2)</sup>. The exclusion criteria were deaths not occurred during pregnancy and the postpartum period; deaths occurred during pregnancy, delivery or in the postpartum period for accidental or incidental causes; maternal deaths that did not occur in the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> Regional Health Boards (DIREs) of the state of Bahia.

The following variables were investigated to describe the epidemiological profile of the maternal deaths: sociodemographic (age, race/color, years of education and marital status); gynecological-obstetric (number of previous pregnancies, number of prenatal appointments, beginning of prenatal care, type of delivery and time of death); characteristics of the deaths (received medical treatment during the disease that caused the death, place of death, cause of death and direct causes of maternal death).

The underlying cause of death was classified as direct obstetric (resulting from obstetric complications during pregnancy, delivery and postpartum) and indirect obstetric (due to previous diseases, or disorders that developed during pregnancy as a result of the physiological changes of pregnancy<sup>(2)</sup>).

Data were collected from the death certificates and records of investigation between the months of July and September 2013, stored in databases, analyzed and processed using version 9.0 of the Statistical Package for Social Sciences (SPSS).

Subsequently, typing errors were corrected and exploratory and descriptive analysis of the sample was conducted, and the simple frequencies of the studied variables were checked.

The project was approved (no 519.522) by the Research Ethics Committee of Universidade do Estado da Bahia, on February 03, 2014 according to the guidelines and standards of Resolution 466/2012 of the National Health Council/Brazilian Ministry of Health (MS) on research with humans<sup>(13)</sup>.

## ● RESULTS

Between 2006 and 2012, 113 maternal deaths were recorded at the SIM/MS in the 37 cities that constitute the DIREs of this study; of these cases, 28 (24.8%) were investigated.

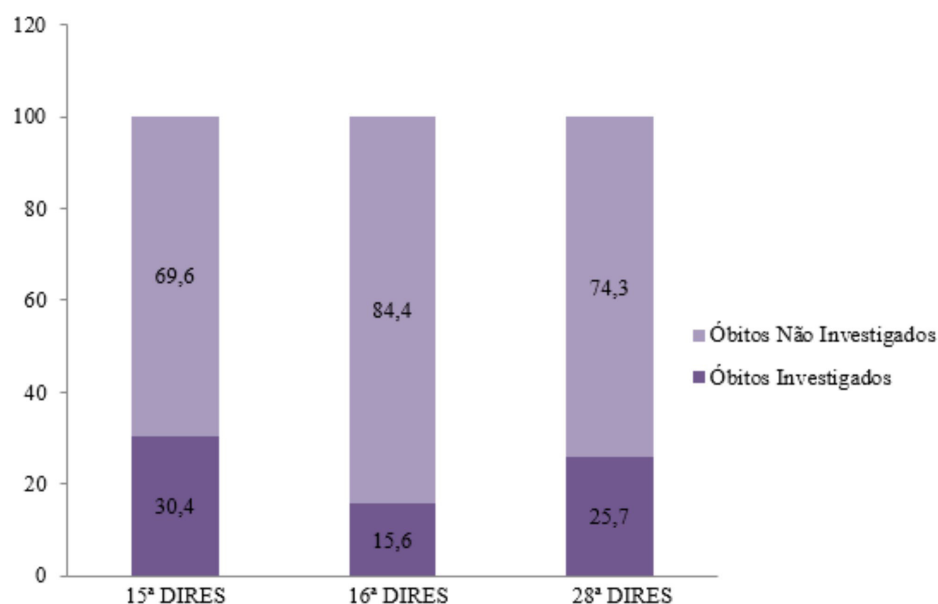
Analysis of maternal deaths in the three health boards (DIREs) showed that the cases were poorly investigated in the three study areas, as follows: 14 (30.4%) maternal deaths occurred in the 15<sup>th</sup> DIREs, 5 (15.6%) maternal deaths in the 16<sup>th</sup> DIREs and 9 (25.7%) maternal deaths in the 28<sup>th</sup> DIREs were investigated (Figure 1).

Several variables of the investigated death certificates (DO) had not been recorded, but in some cases there were so few data available, that the profile of maternal deaths could not be characterized. Regarding the variables with incomplete/ missing data, we stress: usual occupation/area of activity, in 40 (35%) cases and neighborhood/district, in 54 (47.7%) of the cases.

Of the cases of maternal death, 49 (43.4%) were of women aged 20-29 years, 85 (75.2%) were black, 24 (21.2%) had 4 to 7 years of education and 55 (48.7%) did not live with a partner (Table 1).

Analysis of the records of investigation (FI) showed the following prevalence of maternal deaths: 19 (67.9%) women with 1 to 4 pregnancies; 13 (46.4%) attended 4 to 6 prenatal appointments; 13 (61.9%) started prenatal care in the first trimester of pregnancy; 51 (45.1%) died within the first 42 days after delivery; 50 (44.2%) deaths occurred during pregnancy, delivery or abortion; 12 (52.2%) of deaths at delivery concerned women who had cesarean sections (Table 2).

In 84 (74.3%) of the maternal deaths, the women received medical care during the disease that caused



Fonte: Sistema de Informação de Mortalidade/Ministério da Saúde - 2013.

Figure 1– Percentage of maternal deaths investigated in the cities of the 15th, 16th and 28th Dires. Bahia, Brazil, 2006 to 2012. Source: Sistema de Informação sobre Mortalidade/Ministério da Saúde – 2013 (Mortality Information System/Ministry of Health – 2013).

Table 1 – Sociodemographic characterization of maternal deaths in the cities of the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> Dires. Bahia, Brazil, 2006 to 2012

Variable	n	%
<b>Age range (113)</b>		
10-19 years	14	12.4
20-29 years	49	43.4
30-39 years	36	31.8
40 years or above	14	12.4
<b>Race/color (113)</b>		
White	19	16.8
Black	85	75.2
No answer	9	8
<b>Years of education (113)</b>		
None	8	7.1
1 to 3 years	22	19.5
4 to 7 years	24	21.2
8 to 11 years	14	12.4
12 years or more	13	11.5
No answer/skipped	32	28.3
<b>Marital status (113)</b>		
Without a partner	55	48.7
With a partner	40	35.4
No answer/Skipped	18	15.9

Source: Sistema de Informação sobre Mortalidade/Ministério da Saúde - 2013. (Mortality Information System/Ministry of Health – 2013).

the death, 98 (86.7%) of the maternal deaths occurred in the hospital, with direct obstetric cause being the most prevalent cause of death in 71 (62.8%) cases and regarding the direct causes of death, the most prevalent was eclampsia/pre-eclampsia, as these complications occurred in 24 (33.8%) maternal deaths (Table 3).

Table 2 – Gynecological and obstetric characterization of maternal deaths in the cities of the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> DIRES. Bahia, Brazil, 2006 to 2012

Variable	n	%
<b>Age range (113)</b>		
10-19 years	14	12.4
20-29 years	49	43.4
30-39 years	36	31.8
40 years or above	14	12.4
<b>Race/color (113)</b>		
White	19	16.8
Black	85	75.2
No answer	9	8
<b>Years of education (113)</b>		
None	8	7.1
1 to 3 years	22	19.5
4 to 7 years	24	21.2
8 to 11 years	14	12.4
12 years or more	13	11.5
No answer/skipped	32	28.3
<b>Marital status (113)</b>		
Without a partner	55	48.7
With a partner	40	35.4
No answer/Skipped	18	15.9

Source: Sistema de Informação sobre Mortalidade/Ministério da Saúde–2013(Mortality Information System/Ministry of Health – 2013).

\*Total deaths investigated = 28.

\*\*Number of records of investigation (FI) where information was available.

\*\*\*Source: Data obtained from the death certificates (DO) recorded at the SIM.

Table 3 – Characterization of maternal deaths occurred in the cities of the 15<sup>th</sup>, 16<sup>th</sup> and 28<sup>th</sup> DIRES. Bahia, Brazil, 2006 to 2012

Variables	n	%
<b>Received medical care during the disease that caused the death (113)</b>		
Yes	84	74.3
No	9	8
No answer/skipped	20	17.7
<b>Place of death occurrence (113)</b>		
Hospital	98	86.7
Street/At home	11	9.7
Others	4	3.6
<b>Cause of death (113)</b>		
Direct obstetric cause	71	62.8
Indirect obstetric cause	35	31
Unspecified death	7	6.2
<b>Direct causes of maternal death (71)</b>		
Eclampsia/Pre-eclampsia	24	33.8
Bleeding	6	8.5
Abortion	5	7.1
DHEG	3	4.2
Infection	4	5.6
Uterine inertia	3	4.2
Other causes	26	36.6

Source: Sistema de Informação sobre Mortalidade/Ministério da Saúde - 2013. (Mortality Information System/Ministry of Health – 2013).

## ● DISCUSSION

In the present study, the lack of information in death certificates (DO) and the reduced number of deaths investigated (28.4%) were factors that made it difficult to provide a more detailed epidemiological profile of maternal deaths in the studied region.

However, this situation is not only observed in the cities of the Center-North region of Bahia: the high rates of underreporting of maternal deaths in death certificates and the lack of information available (resulting from incorrect completion of death certificates (DO)) make it difficult to obtain a clear understanding of maternal mortality throughout the Brazilian territory<sup>(2)</sup>.

The age range with the highest percentage of maternal deaths was A 20-29 years (43.4%) similar to what was observed in the Brazilian territory (41.8%)<sup>(7)</sup>.

The maternal deaths occurred between 20-29 years are probably caused by lack of proper medical care during pregnancy and postpartum, since this age group is not considered a risk factor for pregnant women<sup>(5)</sup>; it is known that pregnancies under 15 years old and over 35 pose risk to women<sup>(14)</sup>.

Black women from the cities that composed the sample of this study accounted for 75.2% of the maternal deaths in the region, which is four times higher than the number of maternal deaths among white women. In the state of Mato Grosso, black women represented 63% of all maternal deaths compared to the percentage of 29.7% of white women<sup>(15)</sup>.

The vulnerability of black women to maternal death is closely linked to the social status and lifestyle of this group<sup>(15)</sup>. Low socioeconomic status, poor access to high-quality education, poor access to health services and insufficient knowledge of contraceptive practices are some aspects that may be associated to the greater exposure of black women to maternal mortality.

Although most death certificates (DO) had a considerable number of "no answer/skipped" (28.3%) for the variable education, it was found that part of these women had 4 to 7 years of education/schooling (21.2%), a percentage similar to the one obtained in a study in the Northern region of Brazil (30%), in the state of Pará (34.5%) and in Recife-PE (40.5%)<sup>(7, 9, 5)</sup>. The level of education is related to maternal death since women with low educational level are less likely to seek health services and have restricted access to information on sexual and reproductive health<sup>(5, 16)</sup>.

Women with few years of education have less knowledge about health practices; therefore, a low educational level may interfere with the understanding of information provided by health professionals during prenatal care and in the postpartum, with a negative impact on self-care. Consequently, these women are more vulnerable to morbimortality, particularly black women, since the number of illiterate individuals in this group is twice as high as among women<sup>(17)</sup>.

Women who live without a partner represented the highest percentage of deaths in this study (48.7%), as well as in the study in Pará where single women accounted for 66% of maternal deaths<sup>(9)</sup>. The presence of a partner is protective factor for women during pregnancy and the postpartum, since partners often seek health care services when women need them, contributing to reduce complications and death. Thus, women who do not have partners are more susceptible to maternal death<sup>(18)</sup>.

In the present study, part of the women had 1 to 4 previous pregnancies (67.9%), which is consistent with the findings of a study conducted in Recife-PE, where 54.1% of the women who died had the same number of previous pregnancies<sup>(5)</sup>; also, multiparity, a known risk for maternal mortality, was not a predominant characteristic of the women of the study.

It is recommended more than 6 prenatal appointments<sup>(14)</sup>; however, in the present study, 46.4% of the women who died had attended 4 to 6 appointments, a larger number of prenatal appointments than the ones found in the study in Recife-PE where 31.5% of the women attended 1 to 3 prenatal appointments<sup>(5)</sup>.

Also, prenatal appointments began at an early stage (up to the third month of pregnancy) (61.8%), which is similar to the findings of the study conducted in Recife-PE where 67.6% of the prenatal appointments began until the 4th month of pregnancy<sup>(5)</sup>.

The Ministry of Health (MS) recommends that prenatal appointments begin preferably in the first trimester of pregnancy, for the necessary assessments, and such monitoring should continue until the 42th day after delivery, when the postpartum appointment should take place<sup>(14)</sup>.

Nevertheless, not only the number of appointments deserve attention, but also the quality of each appointment, which should ensure humanized care, aiming to reduce morbimortality of mother and infant<sup>(7)</sup>.

Cesarean section, as well as any other abdominal surgery, involves risks and requires care, since women face higher risk of potential complications and death in a cesarean section than in vaginal delivery<sup>(16)</sup>. Depending on the urgency and taking into account the risk-benefit ratio, cesarean section may be indicated<sup>(5)</sup>, which may be one of the factors that explain the high number of deaths in 52.3% of the women who underwent this procedure.

Also, in a study conducted in Juiz de Fora-MG (69.1%) most maternal deaths occurred within 42 days after delivery (43.1%)<sup>(19)</sup>. The postpartum period is a special phase that requires special attention of health professionals. Within the scope of primary care, two postpartum appointments are required,

and health professionals are supposed to guide women on the onset of signs and symptoms that may indicate complications, such as fever, pain or infection in episiotomy or cesarean incision, intense vaginal bleeding, among others<sup>(14)</sup>.

Thus, in-depth studies on the quality of care to postpartum women in hospitals and health units in the cities of the Center-North region of Bahia are needed to identify possible problems in care and develop strategies aimed to improve the quality of services delivered.

Regarding the cases investigated in this study, 86.7% of maternal deaths occurred in the hospital. In Pará, more than 90% of the maternal deaths investigated occurred in hospital units, and the causes of death of these women are very serious, requiring specialized care<sup>(9)</sup>, as it has been demonstrated in this study.

Although most women received medical care during the diseases that caused death (74.3%), 62.8% of maternal deaths were due to direct causes, especially hypertensive disorders (eclampsia and pre-eclampsia) (33.8%), followed by bleeding (8.5%). A study conducted in Ceará reported that 50% of maternal deaths occurred in 2011 had direct causes<sup>(6)</sup>. In Brazil, the three main causes of maternal death in decreasing order are gestational hypertension, bleeding and puerperal infection<sup>(20)</sup>.

The maternal deaths due to direct causes are mostly preventable and are strongly related to social factors to which specific groups e.g. black, poor, indigenous women, among others, can be exposed: lack of access to health services, poor services, professionals unaware of the specific needs of the various groups, and all these factors have a negative impact on maternal health<sup>(15, 5)</sup>.

## ● CONCLUSION

The study showed that the profile of maternal mortality in the investigated region concerns young black adult women, with low educational level, not living with a partner, had 1 to 4 pregnancies, attended 4 to 6 prenatal appointments and started prenatal care at an early stage. The deaths occurred mainly in the postpartum period; most women received medical care for the disease that caused death; direct obstetric cause was the main reported cause, especially eclampsia/pre-eclampsia.

These findings demonstrate the need to improve the record of information on maternal deaths and the investigation of the cases, and also stress that maternal mortality is not merely a health problem: it is also a social issue, since most victims were black women, with low education living with a partner.

Further studies should be conducted on the quality of prenatal care provided during delivery and postpartum, since most deaths had direct causes and not all women were treated in hospitals at the time of death.

The findings of this study can be used in the planning of actions involving the promotion of health, as well as to support the assessment of the current public policies and the restructuring of new health policies aimed to reduce the high levels of maternal deaths in Center-North of the state of Bahia.

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