

## MORTALIDADE MATERNA NO BRASIL E NOS MUNICÍPIOS DE BELO HORIZONTE E UBERABA, 1996 A 2012

## MATERNAL MORTALITY IN BRAZIL AND IN THE CITIES OF BELO HORIZONTE AND UBERABA, 1996-2012

## MORTALIDAD MATERNA EN BRASIL Y EN LAS CIUDADES DE BELO HORIZONTE Y UBERABA, 1996-2012

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### ABSTRACT

**Objectives:** to understand the maternal mortality profile in the city of Uberaba from 1996 to 2012, and compare it with national data and data from the city of Belo Horizonte. **Method:** a study with a quantitative approach, carried out based on secondary data from the Information Department of the Brazilian Unified Health System. The data were submitted to univariate analysis. **Results:** most women were single and had a low education level. In Brazil, 28,713 deaths were reported, 26 in the city of Uberaba, with a prevalence of direct obstetric deaths caused by worsening of preexisting diseases, hypertensive syndromes, and hemorrhages, a profile found in the cities of Uberaba and Belo Horizonte, whereas, in Brazil, the deaths were caused by hypertensive syndromes. **Conclusion:** the study reflected a poor standard of care and the need for public educational policies for the adoption of an evidence-based practice, enabling professionals to make early diagnoses and interventions to ensure safe care with quality. **Descriptors:** Obstetrics; Maternal Mortality; Pregnancy Complications.

### RESUMO

**Objetivos:** conhecer o perfil de mortalidade materna no município de Uberaba entre 1996 e 2012 e comparar com dados nacionais e de Belo Horizonte. **Método:** estudo de abordagem quantitativa, realizado a partir de dados secundários do Departamento de Informática do Sistema Único de Saúde. Os dados foram submetidos à análise univariada. **Resultados:** a maioria das mulheres era solteira e possuía baixa escolaridade. No Brasil, foram registrados 28.713 óbitos, 26 em Uberaba, com predomínio de mortes obstétricas diretas, tendo como causa agravamento de doenças preexistentes, síndromes hipertensivas e hemorragias, perfil encontrado em Uberaba e Belo Horizonte, enquanto no Brasil os óbitos foram decorrentes das síndromes hipertensivas. **Conclusão:** o estudo refletiu um padrão insuficiente de assistência e necessidade de políticas públicas educacionais para adoção de uma prática baseada em evidências, capacitando os profissionais a realizar diagnóstico e intervenções precoces que garantam uma assistência segura e de qualidade.

**Descritores:** Obstetrícia; Mortalidade materna; Complicações na gravidez.

### RESUMEN

**Objetivos:** conocer el perfil de mortalidad materna en Uberaba de 1996 hasta 2012 y comparar con datos nacionales y de Belo Horizonte. **Método:** estudio de enfoque cuantitativo, basado en datos secundarios del Departamento de Informática del Sistema Único de Salud y se sometieron a análisis univariada. **Resultados:** la mayoría de las mujeres era solteras y tenía poca educación. En Brasil, se registraron 28.713 muertes, 26 en Uberaba, con predominio de muertes obstétricas directas, causadas por condiciones preexistentes agravadas por el embarazo, trastornos hipertensivos y hemorragias, perfil encontrado en Uberaba y Belo Horizonte, mientras que en Brasil, las muertes se debieron a trastornos hipertensivos. **Conclusión:** el estudio refleja nivel insuficiente de atención y necesidad de políticas educativas para la adopción de una práctica basada en evidencias, permitiendo a los profesionales realizar el diagnóstico e intervención tempranos para garantizar una atención segura y de calidad.

**Descriptor:** Obstetrícia; Mortalidad materna; Complicaciones del embarazo.

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## INTRODUCTION

Millennium Goals were established by means of pacts mediated by the United Nations (UN) in 2000, in order to resolve major global problems of humankind<sup>(1)</sup>. For this purpose, eight goals entitled “Millennium Development Goals” or “Millennium Goals” were established, of which the fifth goal is intended to “improve pregnant women’s health, with the aim of reducing maternal mortality rate<sup>(1)</sup>.”

Maternal deaths are those that occur within the period between gestation and up to one year after its termination, provided they have a direct or indirect relation to pregnancy, except for incidental or accidental deaths (risks that any individual could be exposed to, regardless of being pregnant)<sup>(2)</sup>.

In Brazil, maternal deaths present a lowering trend, with a decrease of 47% in the total number of deaths (from 543,000 deaths in 1990 to 287,000 in 2010). However, although the progress is significant, the annual rate of decline is still far from being ideal, reaching less than half of what would be necessary to achieve the fifth Millennium Development Goal. To achieve this goal, a decline in the rate of 5.5% per year would be necessary; however, the annual decrease reached, until then, was only 3.1%<sup>(3)</sup>.

The state of Minas Gerais, as well as Brazil as a whole, did not achieve the established goal, reaching 54.3%. In the city of Belo Horizonte, state capital of Minas Gerais, the reduction in the rate was 16.75% and, in the city of Uberaba, it was even less significant, with only 2.7%. Data from 2013 point out that the maternal mortality rate was approximately 41.8 maternal deaths per 100,000 live births in the state of Minas Gerais, 38.2 maternal deaths per 100,000 live births in the city of Belo Horizonte, and 48.0 maternal deaths per 100,000 live births in the city of Uberaba<sup>(4)</sup>.

It is important to emphasize that according to the last report released by the UN in 2013, no country achieved the goals established for this purpose. There is a prevalence of direct obstetric deaths worldwide, and even with the decline in the rates of all causes of death, preexisting diseases worsened by gestation are still a challenge for care. According to this document, hypertensive syndromes, hemorrhages, puerperal infections, the practice of unsafe

abortion, and complications of previous diseases stand out as causes of death<sup>(1)</sup>.

In Brazil, the causes of death of women of childbearing age (10 to 49 years of age) and maternal deaths are associated with lack of information and quality of care<sup>(5)</sup>. The research on causes of maternal deaths enables the planning of actions that aim at the reduction in maternal mortality rate, in addition to the elaboration and development of strategies to improve quality of care, from prenatal to puerperium<sup>(6)</sup>.

Since 2009, there was a reduction in the fertility rate of Brazilian women, consequently reflecting in a reduction in birth rate. However, the mortality rate did not follow this trend, remaining stable, which indicates the need to identify the variables involved and their influence on maternal deaths<sup>(5)</sup>, justifying the development of the present study.

Uberaba is a city in the state of Minas Gerais that belongs to the region of Triângulo Mineiro, and is a reference source for health care for 27 cities in the region. The Federal University of Triângulo Mineiro (UFTM) and its Clinics Hospital is located in this city, which provides tertiary health care for all cities that belong to the regional health of Uberaba. Belo Horizonte is the capital city of Minas Gerais and was chosen to compare municipal (Uberaba) and Brazilian data, as well as to observe maternal mortality trends in these places.

In the face of the magnitude of the theme, the aim of the present study was to understand the maternal mortality profile in the city of Uberaba from 1996 to 2012, and compare it with national data and data from the city of Belo Horizonte.

## METHOD

This was a study with a quantitative approach, based on secondary data extracted by means of access to statistics released by the information Department of the Brazilian Unified Health System (DATASUS, as per its acronym in Portuguese).

All Brazilian records of maternal deaths and those from the cities of Belo Horizonte and Uberaba from 1996 to 2012 were included. This period was used as study cut-off, because the

whole period with information available for public consultation was analyzed.

According to data from the Brazilian Institute of Geography and Statistics (IBGE, as per its acronym in Portuguese) of 2013, Uberaba has an approximate population of 319,000 inhabitants<sup>(7)</sup>. Currently, it has 27 primary healthcare units (Brazilian Primary Healthcare Units/UBS, as per its acronym in Portuguese and Brazilian Family Healthcare Units/USF, as per its acronym in Portuguese), 13 specialized healthcare units, and two emergency care units (ECU). It also has 10 hospitals, of which two are teaching hospitals; one hospital specialized in cancer treatment affiliated to the Brazilian Unified Health System; one hospital specialized in infant care affiliated to the Brazilian Unified Health System; and six private hospitals that accept health insurance.

Belo Horizonte, the capital city of the state of Minas Gerais, has an approximate population of 2,800,000 inhabitants<sup>(7)</sup>. The city has 36 hospitals, with one municipal hospital, two federal hospitals and seven state hospitals. The remaining hospitals provide philanthropic and private care. The primary healthcare system is made up of 141 primary healthcare units, 150 specialized healthcare clinics, and 507 Family Health Strategy teams.

Data collection occurred in March 2015 through analysis of the following variables: maternal age; race/skin color; marital status; education level; and cause of maternal death. These variables were stored in a Microsoft Excel<sup>®</sup> database, validated by double entry, and exported to Statistical Package for the Social Sciences 21 (SPSS) software for processing and analysis through descriptive statistics.

## RESULTS AND DISCUSSION

Currently, societies—worldwide and Brazilian—exist in a period known as “obstetric transition,” characterized by lower fertility rates, higher ageing of the obstetric population, and the prevalence of chronic-degenerative diseases associated with an increasing institutionalization of childbirths<sup>(8)</sup>. Therefore, reflecting on obstetric care, this transition and all risk factors involved that are subject to interventions for the reduction in maternal morbidity and mortality must be considered.

According to data from DATASUS, between 1996 and 2012, 28,713 maternal deaths occurred in Brazil, 252 in Belo Horizonte, and 26 in Uberaba. Through the time analysis of the data shown in Table 1, it can be observed that the frequency of maternal deaths in the three places have presented a trend to stabilization, without significant increases or decreases in rates.

Table 1 – Maternal deaths according to Brazilian data and data from Belo Horizonte and Uberaba, 1996-2012.

Year	Brazil	Belo Horizonte	Uberaba
1996	1,520	18	2
1997	1,851	23	-
1998	2,042	39	3
1999	1,868	14	4
2000	1,677	15	1
2001	1,577	11	1
2002	1,655	13	-
2003	1,584	14	-
2004	1,641	4	-
2005	1,620	12	1
2006	1,623	9	1
2007	1,590	10	1
2008	1,681	13	4
2009	1,872	12	1

<b>2010</b>	1,719	21	2
<b>2011</b>	1,610	11	3
<b>2012</b>	1,583	13	2
<b>Total</b>	<b>28,713</b>	<b>252</b>	<b>26</b>

Source: Information Department of the Brazilian Unified Health System, 2015.

The year of 1998 presented the highest death rates in Brazil and in the capital city, whereas the city of Uberaba had its highest numbers in 1999 and 2008. The lowest rates were found in Brazil in 1996 and in Belo Horizonte in 2004. No cases were reported in Uberaba in 1997 or from 2002 to 2004.

Regarding socioeconomic variables, Table 2 shows a higher incidence of maternal deaths in the age group of 20 to 29 years, both in Brazil and in the city of Uberaba, different from the city of Belo Horizonte, where the prevalent age group was of 30 to 39 years.

Table 2 – Maternal mortality according to age, education level, marital status, and skin color/race – Brazil, Belo Horizonte, and Uberaba, 1996-2012.

	Brazil	Belo Horizonte	Uberaba
<b>Age group</b>			
10 – 14 years	278	–	1
15 – 19 years	3,990	23	–
20 – 29 years	11,905	92	13
30 – 39 years	9,918	114	11
40 – 49 years	2,482	23	1
> 50 years	76	–	–
Ignored	64	–	–
<b>Education level</b>			
None	1,845	9	1
1 – 3 years	3,139	23	5
4 – 7 years	5,503	50	5
8 – 11 years	4,352	64	4
12 years or more	1,476	19	3
Ignored	12,389	87	8
<b>Marital status</b>			
Single	14,753	148	11
Married	9,823	86	9
Widowed	334	6	1
Divorced	439	7	1
Other	1,103	2	3
Ignored	2,261	3	1
<b>Skin color/race</b>			
White	9,314	74	8
Black	2,608	26	9
Yellow	162	3	–
Brown	10,822	109	3
Indigenous	259	–	–
Ignored	5,548	40	6
<b>Total</b>	<b>28,713</b>	<b>252</b>	<b>26</b>

Source: Information Department of the Brazilian Unified Health System, 2015.

Analyzing the results in the literature on the influence of the variable age in cases of maternal deaths, a study conducted in a tertiary hospital of the Southeastern region found the same percentage of deaths in the age group of 20 to 29 years (40%) and of 30 to 39 years (40%)<sup>(9)</sup>. Therefore, analyzing maternal death data from the city of Recife, in the state of Pernambuco, a higher incidence was found in the age group of 20 to 29 years<sup>(6)</sup>. However, a study carried out in the South region identified a higher frequency of deaths among women aged over 40 years<sup>(10)</sup>. Another study carried out in China showed an increase in the incidence of deaths among pregnant women aged under 19 years and over 35 years<sup>(11)</sup>.

Analyzing the variable *education level*, a divergence in the results was found. In Brazil, there was a higher frequency of deaths among women with incomplete elementary school (4-7 years of study). Belo Horizonte had the highest mortality rate among women with complete elementary or high school (8-11 years). In Uberaba, as well as in Brazil as a whole, there was a prevalence of deaths among women with incomplete elementary school; they also presented a lower education level compared with the country and capital city (1-7 years of study). However, this information was ignored on most death certificates. Regarding the variable *education level*, similarly to the data found in the present study, a study conducted in the South region showed that low education level was a risk factor for maternal death<sup>(10)</sup>; this was also shown in studies based on national population<sup>(8,12-13)</sup>. Similar to the results presented, the deaths researched in Recife were more frequent in women with 4 to 7 years of study<sup>(6)</sup>. A Chinese study that found an association between low education level and maternal deaths is also worth mentioning<sup>(11)</sup>.

Therefore, there is a prevalence of women with low education level among victims of maternal mortality. Healthcare professionals must be attentive and focus on this population so that information and guidance necessary for the good development of gestations can be clear and appropriate to effectively achieve health promotion and prevention of diseases<sup>(6)</sup>.

However, a study carried out in a tertiary teaching hospital showed that 56% of the maternal death certificates ignored information about education level<sup>(9)</sup>, as shown in the data extracted from the Brazilian Mortality Information presented in this study.

Regarding marital status, higher mortality rates were found among single women in the three places analyzed. Similarly to the present study, a prevalence of single women or women without steady partners was found in the South region<sup>(10)</sup>. However, a study conducted in the state of Pernambuco showed a prevalence of deaths among women living in stable unions<sup>(6)</sup>; and in 62% of the deaths researched in a tertiary teaching hospital in the Southeastern region, information on women's marital status was not found<sup>(9)</sup>. A study conducted with Chinese women showed that maternal deaths were more frequent among women without partners<sup>(11)</sup>.

According to the literature, women without partners (steady partner) present lower adherence to prenatal appointments (frequency and behaviors)<sup>(13)</sup>. Marital status is an extremely relevant variable, because it shows that the support of partners, both affective and financial, is essential in this stage of life of women, and is considered a protection factor against maternal morbidity and mortality<sup>(6)</sup>.

With regard to the variable race/skin color as reported, there was a prevalence of deaths among brown women, except in the city of Uberaba, which recorded a higher number of deaths among black women. A study conducted in the South region and another with national data showed a prevalence of women who reported being black<sup>(8-9)</sup>. An American population study did not find a statistical association between race/skin color and maternal deaths, although a prevalence of deaths among Afro-descendants was found<sup>(14)</sup>. Studies conducted in the city of Recife and in a hospital in the South region showed a prevalence of deaths among white women<sup>(6,9)</sup>. However, a study carried out in the United Kingdom showed that East Indian ethnicity was considered a risk factor for maternal deaths<sup>(15)</sup>. Therefore, it was possible to identify controversies over the results regarding race/skin color and occurrence of maternal deaths.

A study carried out in the state of Mato Grosso, whose aim was to evaluate race/skin color and occurrence of maternal mortality, identified that black women had 5.13 times more probability to die and, among indigenous women, this probability increased to 5.71. Hypertensive syndromes were the most frequent causes of deaths among Afro-descendant women, whereas complications with labor and childbirth prevailed among indigenous women<sup>(16)</sup>.

It is worth mentioning that information on race/skin color on health forms and in medical records is mandatory, and professionals must not use their senses to judge the skin color, but consider the race declared by patients<sup>(17)</sup>.

Table 3 presents the characteristics of type of death and time of occurrence. There was a

prevalence of direct obstetric deaths; however, the time when deaths occurred was not reported on most death certificates and was considered ignored. However, when declared, the most frequent deaths were those immediately after childbirth or up to 42 days postpartum, that is, during the puerperal period.

Table 3 – Maternal mortality according to type of death and time occurred - Brazil, Belo Horizonte, and Uberaba, 1996-2012.

	Brazil	Belo Horizonte	Uberaba
<b>Type of death</b>			
Direct obstetric death	20,197	178	17
Indirect obstetric death	7,633	68	6
Not reported	883	6	-
<b>Time when death occurred</b>			
During pregnancy, childbirth, or abortion	7,488	55	8
Immediately after childbirth or up to 42 days	7,888	56	8
From 43 days up to 1 year after childbirth	695	7	1
One year after childbirth	1,068	18	4
Inconsistent period	3,070	9	1
Ignored	8,504	107	4
<b>Total</b>	<b>28,713</b>	<b>252</b>	<b>26</b>

Source: Information Department of the Brazilian Unified Health System, 2015.

Corroborating the results of the present study, according to data from the World Health Organization, there is a prevalence of maternal deaths classified as direct obstetric deaths worldwide (73%). Among causes of direct obstetric deaths, hemorrhages are in first place (27%), followed by hypertensive syndromes (14%), and infections (10%) and, according to the same report, the total of the three causes together represents more than half of maternal death causes worldwide<sup>(18)</sup>.

Analyzing the causes, it is observed that,

from 1996 to 2012 in Brazil, deaths caused by hypertensive syndromes were more frequent, followed by preexisting diseases worsened by gestations, childbirths or puerperium, and hemorrhages. In the city of Belo Horizonte, the most frequent deaths were caused by worsening of preexisting diseases, followed by hypertensive syndromes, and hemorrhages. In the city of Uberaba, the most frequency deaths were caused by worsening of previous diseases and those caused by hypertensive syndromes and hemorrhages, as shown in Table 4.

Table 4 – Maternal mortality according to cause of death - Brazil, Belo Horizonte, and Uberaba, 1996-2012.

Cause of death	Brazil	Belo Horizonte	Uberaba
Preexisting maternal diseases worsened by gestation, childbirth, and puerperium	5,472	48	5
Hypertensive syndromes	6,714	45	3

Hemorrhages	5,013	40	3
Complications from abortion	2,392	38	3
Puerperal infections	2,057	16	3
Infectious parasitic diseases worsened by gestation, childbirth, and puerperium	593	7	1
Thromboembolic complications	1,211	11	-
Complications related to care provided during gestation	301	2	1
Anesthetic complications	112	-	1
Complications related to care provided during labor and childbirth	880	9	2
Complications related to care provided during puerperium	912	12	1
Others	3,056	24	3
<b>Total</b>	<b>28,713</b>	<b>252</b>	<b>26</b>

Source: Information Department of the Brazilian Unified Health System, 2015.

Quality of care provided to pregnant women with pre-eclampsia and eclampsia reduces mortality risk in 50%<sup>(19)</sup>. In addition, the most common preventable error in the care provided to patients with hypertensive syndromes is the lack of attention to blood pressure control and signs and symptoms of complications, which require accurate evaluation on the part of nurses and immediate intervention by the whole obstetric team<sup>(19)</sup>.

According to a study done on a national basis<sup>(12)</sup>, one-quarter of the gestations in Brazil may be classified as high risk. The following risk factors stood out among those that presented significance: maternal age under 15 years and over 35 years; more than three gestations; and having a negative outcome in previous gestations, which may indicate previous maternal disease. It is worth mentioning that, when required, it is difficult to be transferred to high-risk services in 11.5% of the cases<sup>(12)</sup>. When a gestation is classified as high risk, it increases by 4.5 times more the probability of developing a severe maternal morbidity condition<sup>(11)</sup>, thus increasing mortality risk.

In comparison, a study carried out in the United Kingdom identified the following risk factors for maternal deaths: not having carried out prenatal follow-up or having carried out it improperly, and use of illicit drugs during gestation. Hypertensive syndromes and presence

of previous comorbidities significantly increased the risk of death (by 3.5 times)<sup>(15)</sup>.

Although not having reached the Millennium Goal, Brazilian obstetric care has achieved some advances. Currently, about 99% of women carry out at least one prenatal appointment; 76% carry out the first appointment before 16 weeks; and 73% carry out six or more appointments (as recommended by the Brazilian Ministry of Health)<sup>(12)</sup>. However, even with these advances, three-quarters of maternal deaths are directly obstetric and caused by hypertensive syndromes or hemorrhages, which could be prevented with care with quality, especially during labor and childbirth<sup>(20)</sup>. Although there is a higher adherence of women to prenatal care, there is still a higher number of cases of congenital syphilis, which shows qualitative weaknesses in care during gestation<sup>(20)</sup>.

Considering the presented data, Brazil and its several regions need great qualitative advances in care for the pregnancy and puerperal cycle, in order to achieve a reduction in maternal mortality. In addition, the need for active monitoring of severe maternal morbidities stands out as an effective tool for the detection of severe cases, early intervention, and prevention of deaths<sup>(20)</sup>.

Based on the results, the present study reflects a poor standard of care for pregnant women and the need for public policies, as well

as training of healthcare professionals for the adoption of an evidence-based practice able to carry out early diagnoses, in addition to fast interventions to prevent mortality and ensure safe care with quality.

It is worth mentioning that nurses are essential for maternal healthcare, which is the focus of the fifth Millennium Goal. Therefore, understanding and monitoring causes of maternal deaths and their characteristics may provide effective nursing intervention strategies, able to reduce these indicators, provide greater patient safety, and ensure improvements in care.

## CONCLUSION

The present study describes the maternal mortality profile from 1996 to 2012. In Brazil, 28,713 deaths were reported, 26 in the city of Uberaba, with a prevalence of direct obstetric deaths caused by worsening of preexisting diseases, hypertensive syndromes, and hemorrhages, profiles found in the cities of Uberaba and Belo Horizonte, whereas in Brazil as a whole the deaths were caused by hypertensive syndromes.

The causes of maternal deaths correspond to the Brazilian reality, which shows weaknesses in maternal care. The present study reflects a poor standard of care for pregnant women and the need for public policies, as well as training of healthcare professionals for the adoption of an evidence-based practice able to carry out early diagnoses, in addition to fast interventions to prevent mortality and ensure safe care with quality.

It is worth mentioning that nurses are essential for maternal healthcare, which is focus of the fifth Millennium Goal. Therefore, understanding and monitoring causes of maternal deaths and their characteristics may provide effective nursing intervention strategies, able to reduce these indicators, provide greater patient safety, and ensure improvements in care.

The use of secondary data is a limitation of the study, because reliability of data cannot be ensured due to the possibility of typing errors, as well as errors in the filling in of death certificates. In addition, the present study is not sufficient to discuss such a broad theme, because further development through studies able to identify risk factors for maternal morbidity and mortality, and ways to achieve the goals proposed by the fifth Millennium Goal, are required.

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