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Maternal mortality in a regional health jurisdiction in the Brazilian state of Maranhão: a retrospective study

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ABSTRACT

Aim: To investigate the causes of maternal death in a regional health jurisdiction of the Brazilian state of Maranhão. **Method:** This is a retrospective study exploring the maternal deaths from 2007 to 2011. The maternal deaths analyzed were of women between 10 and 49 years old during the pregnancy-puerperal cycle. **Results:** Among the most frequent causes of death, the main one noted was gestational hypertension syndrome (GHS) (37.9%), followed by hemorrhagic syndrome (31.1%) and other causes (31%). **Conclusion:** The maternal mortality ratio of the regional health jurisdiction studied is elevated and, even if the numbers used were underestimated, urgent reduction measures must be adopted, especially when dealing with prevention and control of GHS, the main cause of maternal mortality in this jurisdiction.

Descriptors: Maternal Mortality; Causes of Death; Women's Health; Nursing.

INTRODUCTION

Maternal mortality is still one of the most serious health issues in Brazil and in the world. It is considered one of the most critical violations of the human rights of women, and an avoidable tragedy in 92% of the cases, which occur mainly in developing countries⁽¹⁾.

A study performed by the World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and the United Nations Fund for Population Activities (UNFPA) estimated that, since 2005, about 536,000 women around the world died, victims of complications related to the pregnancy-puerperal cycle. In developed countries, the index of maternal mortality rarely exceeded the standard of 10 women per 100,000 babies born alive. On the other hand, in developing countries this number is 10 to 50 times higher, varying from 30 to 40 per 100,000 babies born alive, to 400 to 500 per 100,000 babies born alive in very poor areas of these same countries^(2,3).

In Brazil the magnitude of maternal mortality from 1990 to 2010 was 68 deaths per 100,000 babies born alive, and the corrected maternal mortality ratio (MMR) was 77 deaths per 100,000 babies born alive, corresponding to 1,623 maternal deaths. The majority of these deaths could have been avoided if the conditions in the areas that are subject to the worst health conditions, and an elevated risk for the causes of maternal death, were similar to those in developed countries, where the political directives and the commitment of health professionals are primordial aspects to prevent such deaths. The United Nations "Goals of the Millennium" establishes a rate of 35 maternal deaths per 100,000 babies born alive before the year 2015. In the last report of the WHO about maternal mortality Brazil achieved a lower position than the goal set for the millennium⁽⁴⁾.

Among the Brazilian regions the Northeast and the Southeast present the highest frequencies of maternal deaths, as from the 1,617 deaths notified in the year of 2010, 1,106 of them occurred in both regions. In the Brazilian state of Maranhão from January to September 2011 there were 70 deaths of women due to complications during pregnancy and/or delivery^(4,5).

This demonstrates that institutions and health professionals, together with more efficient public policies, must aim to provide a holistic caring experience for the women and the promotion of their health during the pregnancy-puerperal cycle, in order to avoid the causes of maternal death. According to the Parliamentary Commission of Inquiry (PCI) into maternal mortality, the death of the mother develops into a vertiginous disaggregation of the family cell, as children are distributed among relatives and the father leaves, looking for employment or to reconstruct his life. Or, sometimes it is the oldest sister who takes the lead and overlooks the others, which contributes significantly so that the other children present a higher probability of suffering emotional distress and school dropout⁽⁶⁾.

Based on the perspective that maternal death is considered avoidable, the investigation of the causes that determine it must be stimulated through research, which makes this study relevant by contributing to sanitary authorities, society and women, in this order, so there is no decrease in the investment in the pregnancy-puerperal cycle care. The causes that lead to maternal death are well known. There is a high demand for priority to be given to holistic health care, and to finally recognize the practices to promote reproductive health and the right to citizenship.

This study aims to investigate the determining causes of maternal mortality in a regional health jurisdiction of the Brazilian state of Ma-

ranhão, during the period from 2007 to 2011. It describes the personal and social aspects of women, and delimitates the MMR in this jurisdiction, through the data obtained from the Mortality Information System (MIS) and the death certificates issued by the jurisdiction itself during the period established.

METHOD

This is a retrospective, exploratory study, which investigated the maternal deaths registered in the Death Records of the MIS of the Regional Health Jurisdiction of the city of Imperatriz, in the Brazilian state of Maranhão, between 2007 and 2011.

The state of Maranhão, located in the northeast region of Brazil, is divided in 19 regional health jurisdictions, which are responsible for management of local actions in health. The Regional Health Jurisdiction of Imperatriz covers 14 cities and is one of the most important jurisdictions of the state. According to CIB/MA Resolution 46, of June 16th 2011, the municipalities that compose this jurisdiction are: Amarante, Buritirana, Campestre do Maranhão, Davinópolis, Estreito, Governador Edison Lobão, Imperatriz, João Lisboa, Montes Altos, Porto Franco, Ribamar Fiquene, São João do Paraíso, Senador La Roque and Sítio Novo. These municipalities together have 482,083 inhabitants, of which 242,268 are women⁽⁷⁾.

The municipality of Imperatriz is the second most populated in the state and the headquarters of the jurisdiction are located here; it also has a female population in the reproductive age group of 128,323 women. The municipality also presents the second best Human Development Index (HDI = 0.722) of the state, and has a strategic geographic and economic location, with a total area of 1,538.1 km², supporting the

neighboring municipalities and nearby states of Tocantins and Pará. With regard to healthcare in particular it is considered as a model for these other locations⁽⁸⁾.

To define maternal death we followed the International Statistical Classification of Diseases and Related Health Problems (CID 10). It is defined as the death of a woman during pregnancy or in a period of up to 42 days after the end of gestation, irrespective of the duration or location of the pregnancy, based on a previously reported cause or because of an aggravation started during pregnancy or by measures taken in regards to it, however not by causes due to accidents or incidents⁽⁹⁾.

The investigation of the causes of maternal death between the years 2007 and 2011 was undertaken between May and July 2012. The absolute and relative frequency of the number of maternal deaths were analyzed, as well as the MMR of the deaths of women of reproductive age, which is between 10 and 49 years old, who were residents in the area of covered by this health jurisdiction. The data was recorded in an electronic spreadsheet Microsoft Excel®, version 2003. The deaths caused by non-obstetric reasons, as well as the ones with external causes not related with pregnancy or its conduct were not counted, nor were these included in calculation of the MMR.

In order to calculate the MMR, the data found in the Brazilian Information System of Born Alive (SINASC, in Portuguese)⁽¹⁰⁾ was used, based on the years researched by this study, according to the formula below:

$$\text{MMR} = \frac{\text{number of direct and indirect obstetric deaths}}{\text{number of born alive}} \times 100,000$$

According to the Resolution 196/96 of the Brazilian National Health Council, this study was approved by the Committee of Ethics in Research of the College Hospital of

Maranhão Federal University, under protocol 231/11, and was presented to the board on September 12th 2011. This study deals with ethical aspects related to human beings and safeguards the anonymity of the subjects of the research.

RESULTS

In the period from 2007 to 2011 there were 660 deaths of women of fertile age in the Regional Health Jurisdiction of Imperatriz. Among these, the MIS registered that 29 women were in their pregnant-puerperal cycle, with a predominance of maternal deaths in the year 2009. During the period studied there were 43,458 births, thus making up a final MMR of 66.73:100,000 born alive (Table 1).

Table 1. Maternal Mortality Ratio at the Health Regional Jurisdiction of Imperatriz. Imperatriz, Brazil, 2007-2011

Year	Number of Deaths	Number of Born Alive	MMR (per 100,000 born alive)
2007	7	9,119	76.76
2008	4	7,450	53.69
2009	8	9,025	88.64
2010	5	8,745	57.17
2011	5	9,119	54.83
TOTAL	29	43,458	66.73

Source: SIM, SINASC and Health Regional Jurisdiction of Imperatriz, 2012.

Out of the 29 maternal deaths analyzed in this study 27.58% of the women were between 21 and 25 years old, 65.1% were brown skinned, 65.5% were single, 34.4% had high school education and 72.4% were housewives.

When analyzing the MMR per municipality, Imperatriz, the headquarters of the jurisdiction analyzed presented 14 maternal deaths and an MMR around 57.55:100,000 born alive, oscillating

in the years of 2007, 2009 and 2011. This information represents almost half of the maternal deaths of the health jurisdiction studied, which is a number incompatible with the one stipulated by the WHO and the Pan American Health Organization (PAHO).

Among the determining causes of maternal deaths (Table 2), the main cause was gestational hypertension syndrome (GHS) at (37.9%), followed by hemorrhagic syndrome (31.1%), and other causes (31%).

Table 2. Distribution of maternal deaths, according to specific causes, at the Health Regional Jurisdiction of Imperatriz. Imperatriz, Brazil, 2007-2011

Causes of Death ^a	N	%
Gestational Hypertension Syndrome		
Hypertensive disorders (O10-O16)	11	37.9
Gestational Hemorrhagic Syndrome		
Obstetric embolism by blood clot (O88.2)	3	10.4
Previous placenta (O44.1)	2	6.9
Chock during or subsequently after labor and labor (O75.1)	2	6.9
Placental abruption (O45.9)	2	6.9
Other causes		
Puerperal infection (O85)	4	13.8
Other afecions that complicate pregnancy, delivery and puerperal(O99.8)	2	6.9
Other forms of uterine inertia (O62.2)	2	6.9
Cardiomiopathy during puerperal (O90.3)	1	3.4
TOTAL	29	100

Source: Death Records of the SIM of the Health Regional Jurisdiction of Imperatriz, 2012

Note: a The numbers in brackets represent the codes described in Chapter XV of CID-10.

This study also considers information about the location where the maternal deaths took place. The results show that almost 100% of them occurred in a hospital environment, from which 44% were hospitals of the public health network.

Furthermore, 51.8% of the deaths identified by this study occurred during pregnancy, during the delivery or during an abortion, and 48.2% were during the puerperal stage.

DISCUSSION

The female characterization of the subjects in this study, with regards to their age, ethnicity, marital status, education and working activity shows the level of social vulnerability in their lives and the contribution of these social elements to the occurrence of maternal deaths in this health region. Recent studies trace a line of maternal deaths occurring in women between 30 and 39 years old. This age profile has a higher frequency of some prevalent critical diseases during pregnancy, such as GHS and gestational diabetes, as well as spontaneous abortion^(11,12). In contrast to these results, in this study it was seen that the age group of the women with a higher maternal death rate was from 21 to 25 years old.

The brown skin factor matches other similar studies in the area in which there is a predominance of maternal deaths among brown and black women^(12,13). The studies that indicate these results relate this type of situation to factors such as, the biological predisposition of brown and black women to some diseases, for example, arterial hypertension and preeclampsia, the low quality of pre-natal care received, and the lack of specific actions from health professionals directed to the risks that brown- and black-skinned women are exposed to during the pregnancy-*puerperal* cycle.

Authors also mention that single marital status represents a relevant risk factor that can lead to maternal death, due to the lack of support of a partner during situations of vulnerability during the pregnancy-*puerperal* cycle^(13,14). Corroborating with these results, this study confirmed that the largest number of women affected by maternal death were single. Thus, while planning actions that are aimed at the reduction of maternal death, it is fundamental that specific actions directed to the female po-

pulation are included, especially those living in socially and economically vulnerable conditions.

The results of the study demonstrate an elevated MMR in the Regional Health Jurisdiction of Imperatriz; a number of around 57.55 per 100,000 born alive, which is far above the WHO recommended rate. For this organization an acceptable level should reach a MMR below the 20 per 100,000 born alive limit. MMR is characterized as one of the indicators of the state of health of the female population. Therefore, its elevation demonstrates maternal death as a relevant issue in public health, which requires an even greater amount of research capable of defining the magnitude and the variation of this issue throughout time⁽¹⁵⁾.

It is seen that, based on the 29 death certificates analyzed in this study, the real scenario could be underestimated. For example, in the year of 2011 alone in the whole Brazilian state of Maranhão the number of maternal deaths reached 70 individuals.⁽¹⁶⁾ This suggests that there were some errors at the time the cause of death was determined. These results, despite the fact they may be underestimated, are an important representation of the real connections between maternal mortality and its causes.

Studies related to the topic concluded that the likely sub-notification of the information related to maternal mortality started with the wrong notification of the cause of death, and the difficulty in interpreting death records, especially due to lack of attention on the part of health professionals while filling in the forms, and in many situations by omitting extremely important data, some even linked to the cause of death. A similar study performed in a public maternity hospital, located in the municipality of Fortaleza, in the Brazilian state of Ceará, registered 96 deaths due to maternal causes in the period from 2000 to 2008, and of that number 62% of those were related directly to obstetric reasons⁽¹⁷⁾.

The caring tasks related to maternal mortality are still a challenge. To admit elevated levels of maternal death, particularly due to avoidable causes, is to demonstrate the non-effectiveness of health services. This follows the difficulty in accessing these services for family caregivers, the frequency of pre-natal consultations, and assistance at time of the delivery and during the puerperal stage. This means that as the healthcare service becomes more equipped and structured during the pregnancy-puerperal cycle, the numbers of maternal mortality will be lower^(17,18).

Specifically in Brazil it is noted that the MMR fell between 1999 and 2010, but was slower than expected. It is necessary to call attention to the fact that today it is stagnated⁽¹⁷⁾. At the Regional Health Jurisdiction of Imperatriz, due to the organization of the health system, the sub-registry is limited to the deaths not declared as maternal. This directly influences the lack of observation and the non-operationalization of the present policies of women's care during the pregnancy-puerperal cycle.

Based on such observation, it is necessary to invest in the quality of the healthcare service and most of all to that destined for women. Therefore, all people responsible (researchers, health professionals, managers and representatives of the civil society in the area of health) need to understand the responsibility and the challenge presented by maternal death, considering all factors that determine its occurrence and that will lead to its decline⁽¹⁸⁾.

As a consequence, it is important to agree on the necessity of paying particular attention to the whole social situation and the health monitoring network of women during the pregnancy-puerperal cycle, especially during pregnancy. At this time an effective and high-quality pre-natal care must be given; in addition to adequate consultations and examinations

there has to be the opportunity to exchange experiences and knowledge about pregnancy, in order to generate better understanding about the development of pregnancy and the possible signs and/or symptoms that can lead to maternal death⁽¹⁹⁾.

The main causes of female mortality in Brazil are cardiac diseases, followed by neoplasms, respiratory illnesses, endocrinal diseases, and then nutritional issues. Female mortality due to developments during pregnancy, delivery and the puerperal stage are the tenth cause of death among women⁽¹³⁾.

Maternal death in developing countries such as Brazil is similar to a silent epidemic. It is a public health issue, mostly because of its magnitude – 90% of the causes are avoidable⁽¹⁴⁾, a fact also seen in the regional health jurisdiction studied.

At any time during pregnancy the direct causes are the main factors that contribute to maternal death, among them GHS is the leading cause, followed by hemorrhages⁽¹⁷⁾. GHS as the main cause of maternal death, as observed in this study, corroborates with the findings of the majority of the studies about the causes of maternal death^(13,15,19).

Hypertension is a condition that can be clearly identified during pre-natal consultations, which leads to the adoption of the recommended treatment to reduce the consequences on the mother and the fetus. Maternal death, especially those linked with GHS, is responsible for one fourth of all maternal deaths in Brazil, which also indicates some issues with quality, or lack, of pre-natal care⁽¹⁸⁾.

GHS is seen in many ways: gestation hypertension, chronic arterial hypertension, light preeclampsia, acute preeclampsia, superimposed preeclampsia and HELLP syndrome⁽¹⁹⁾.

In addition to this syndrome as the main cause of maternal death, this study also indicates

hemorrhage as a secondary cause. Corroborating with other studies^(17,19), the prevalence of post-partum hemorrhage and acute post-partum hemorrhage are estimated at 6% and 1.8%, respectively, in all deliveries, despite the fact they are responsible for the evolution to maternal death.

The presence of hemorrhage is generally associated with the lack of adequate assistance during delivery and during the time immediately post-partum. It is more elevated in developing countries and is common in multiparous women in lower socioeconomic strata⁽¹⁶⁾. Based on that information, assistance during delivery has an extremely relevant role as the majority of the deaths will occur during or near to the delivery. The intervention of qualified professionals and well structured health institutions to resolve such obstetric emergencies is fundamental.

Infections also represent another important cause of maternal death identified in this study (13.8%), however they are less frequent in comparison to other studies that researched a similar topic. It is essential to reduce the elevated levels of this type of death due to infections, after the development of tasks that aim to reduce the risk factors that lead to puerperal infection^(17,19).

CONCLUSION

This study makes a contribution to understanding the problem of maternal mortality in the Regional Health Jurisdiction of Imperatriz. Its importance is reinforced by many other studies about the topic published in Brazil in the past years.

The results of this study show that the MMR of the health jurisdiction studied is still elevated and may be underestimated. It is urgent that measures are adopted to reduce these numbers. GHS is the main cause of maternal mortality in

this jurisdiction, as well as in other regions of Brazil. It is possible that this situation can be reversed at the beginning of the pregnancy stage.

We suggest that, based on the results of this study, it is necessary to have a particular reformulation and give attention to women in all stages of life. This should include new practices in care during the pregnancy-puerperal cycle, especially with regard to the early education of the pregnant woman about the healthcare services, giving more opportunities to prevent maternal death.

Within this perspective, such reformulation in women's healthcare aims to have an early evaluation of the possibilities of reproductive risk by identifying the factors considered imminent to death, for example GHS; this enables women to have an effective healthcare service. The difficulties found during the performance of this study were related to the search for reliable data about maternal mortality in the health jurisdiction, as they show a tendency to carelessness when the records were completed, such as some fields are declared as "not applicable" many times.

We hope that this research can stimulate the continued exploration of this topic, amplifying scientific production in less studied locations, such as the Brazilian states in the Northeast region. This problem deserves careful attention and the mobilization of professionals, health services and managers in the promotion and effectiveness of public policies that aim to confront maternal mortality.

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