

Title: Severe maternal morbidity in Brazil: analysis of the incidence of maternal near miss, for the federation units, in the period between 2010 and 2019

Michelle Elaine Siqueira Ferreira (Demography Department and Cedeplar - UFMG)

Raquel Zanatta Coutinho (Demography Department and Cedeplar - UFMG)

Bernardo Lanza Queiroz (Demography Department and Cedeplar - UFMG)

INTRODUCTION

Maternal and child health is considered a crucial element in the fight against poverty and underdevelopment on a global scale and, for this reason, was highlighted in the elaboration of the goals for social and human development, assumed during the Millennium Summit in 2000, and the Sustainable Development Goals, agreed upon during the United Nations General Assembly in 2015. Brazil, a signatory country in both events, despite having assumed the commitment to reduce its maternal mortality ratios (MMR) to 30 deaths per 100,000 live births by the year 2030, has observed a stagnation in the indicator, which was around 59.1 deaths per 100,000 live births in the year 2018, according to data from the Brazilian Mortality Information System (SIM).

Although maternal death is a tragic experience, not only in the family sphere, but in society in general, in absolute numbers, including in developing countries, it is a rare event. Therefore, even in countries with high maternal mortality ratios, as in the case of Brazil, the analysis of these deaths may not offer robust information about the main obstacles to the reduction of these indicators. For this reason, cases of severe maternal morbidity have been analyzed to elucidate the conditions and quality of obstetric services in various contexts of low-, middle-, and high-income countries. Besides occurring more frequently than maternal death, they share similarities regarding the causes that led to the outcome (HERDT et al. 2021; CHHABRA, 2014; SAY et al. 2009).

Severe maternal morbidity is conceptualized by the World Health Organization as *maternal near miss*, a term is used to describe conditions of maternal morbidity so severe that, if adequate and timely procedures had not been adopted, they could have led a woman to death during the period of pregnancy, delivery, or puerperium (ANDRADE et al. 2018; SAY et al. 2009). Studies about the topic indicate that, even if a woman survives

a severe morbidity condition during the gravidico-puerperal cycle, she may suffer irreversible sequelae (CARVALHO et al. 2019). Moreover, *maternal near miss* events are associated with increased risk of fetal and neonatal death (SAY et al. 2009; KALE et al. 2017). In this regard, the WHO states that while reducing maternal death should remain a priority on the global agenda, merely surviving pregnancy and childbirth should not be considered a marker of good obstetric care, and it is critical to expand efforts to reduce injuries and disabilities caused by adverse events related to maternal health (WHO, 2019).

The objective of this study is to describe the incidence of *maternal near misses* in Brazil, in the period from 2010 to 2019, for all the Brazilian Federation Units. The results of the study can contribute to a better understanding of the barriers associated with the maintenance of high maternal mortality ratios in the country, as well as enable the evaluation of the quality of the supply of services aimed at maternal health and, consequently, the adoption of effective policies to reduce maternal morbidity and mortality indicators.

METHOD

This is a descriptive epidemiological study that used data from all hospitalizations for obstetric causes recorded in the Hospital Information System of the Brazilian Unified Health System (SIH-SUS) between the years 2010 and 2019. The SIH-SUS is the system responsible for processing information on all hospitalizations carried out in public hospitals or in the health insurance network of the Brazilian Unified Health System. The data are public and made available by month and year for each Federation Unit by the SUS Computer Department (DATASUS). For this reason, the SIH-SUS is an important source of information for following up and monitoring Brazilian health indicators.

The maternal near miss ratios were calculated, for each of the 27 Brazilian Federation Units, by dividing the cases identified as maternal near miss by the total number of women hospitalized for obstetric causes in the period of analysis, according to the following equation

$$\text{MNMR} = \frac{\text{Number of maternal near miss events}}{\text{Number of hospitalizations for obstetric causes}} * 1,000$$

The calculation procedure consisted in identifying women, aged between 15 and 49 years, hospitalized for obstetric causes in the period. Hospitalizations for obstetric causes were considered those recorded by codes of Chapter XV (Pregnancy, Childbirth and Puerperium) of the 10th International Classification of Diseases and other Health Related Problems or for whom some procedure performed during hospitalization was part of the obstetric procedure list defined by the SIH-SUS.

To identify cases of maternal near miss, based on the 25 criteria proposed by the World Health Organization (SAY et al. 2009), the definition of each criterion was matched with the ICD 10 code reported in the variable fields “Main Diagnosis” or “Secondary Diagnosis” of the SIH-SUS. The criteria for identifying cases of *maternal near misses* are based on clinical, laboratory and management conditions capable of indicating any type of organic dysfunction (SAY et al. 2009).

The *maternal near miss* ratios were calculated for each state and for each year of the analysis period.

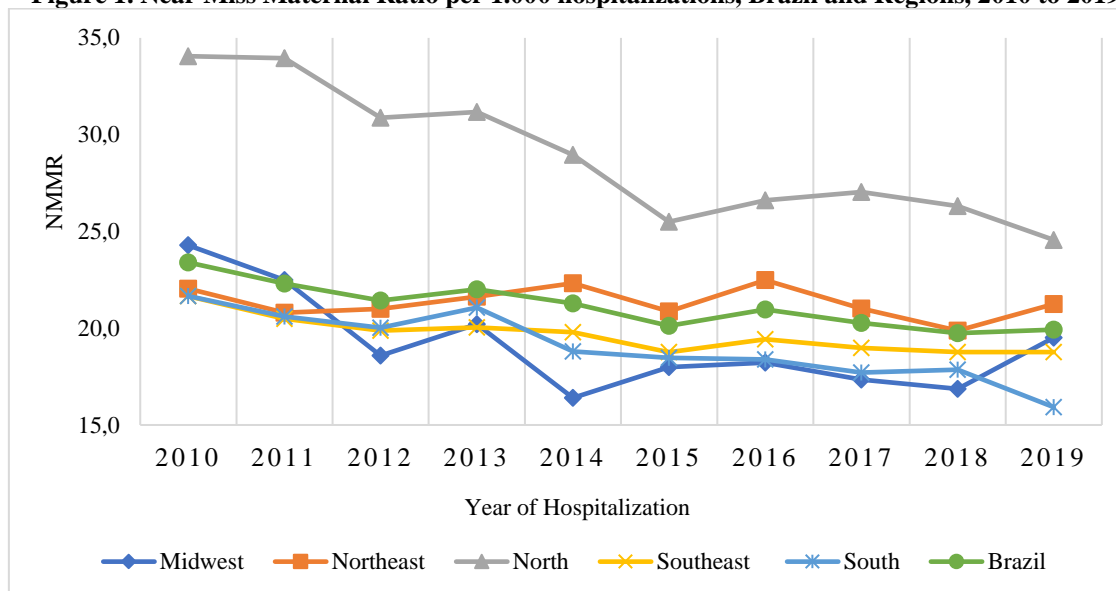
RESULTS

In the period between the years 2010 and 2019, 23,714,216 hospitalizations due to obstetric causes, of women aged 15 to 49 years, were registered in SIH-SUS. Based on the criteria recommended by the WHO (SAY et al. 2009), 501,123 cases of *maternal near misses* were identified, resulting in an RNMM of 21.13 cases per 1,000 hospitalizations for the period.

Figure 1 presents the evolution of the causes for *maternal near miss*, according to macroregion of Brazil, for the period from 2010 to 2019. An important differential is observed between the *maternal near miss* ratios recorded in the North region and the other regions. In the year 2010, while the South and Southeast regions recorded NMR of 21.7/1,000 hospitalizations, the lowest rates for that year, the North region recorded a NMR of 34.1/1,000 hospitalizations. In 2019, the final year of the observed period, even though the region showed a 27.8% reduction (NMR: 24.1/1,000 hospitalizations) it remained as the region with the highest NMR, followed by the Northeast (NMR: 21.2/1,000 hospitalizations), Midwest (NMR: 19.5/1,000 hospitalizations), Southeast (NMR: 18.8/1,000 hospitalizations) regions, with the lowest NMR recorded in the South region, 15.9/1,000 hospitalizations.

On going analysis is exploring individual level factors associated with suffering a Near Miss, such as age, race and education level; further analysis will also explore factors associated with presenting comorbidities and high risk at the time of hospitalization and also factors associated with women´s outcome (near miss or maternal death).

Figure 1. Near Miss Maternal Ratio per 1.000 hospitalizations, Brazil and Regions, 2010 to 2019



Source: Hospital Information System

REFERENCES

- ANDRADE, M.S. et al. Itinerários terapêuticos de mulheres com morbidade materna grave. **Cad. Saúde Pública**, Rio de Janeiro, v. 34, n. 7, e00091917, 2018
- CARVALHO, Beatriz Aguiar da Silva et al . Temporal trends of maternal near miss in Brazil between 2000 and 2012. **Rev. Bras. Saude Mater. Infant.**, Recife , v. 19, n. 1, p. 115-124; 2019 .
- CHHABRA, P. Maternal near Miss: An Indicator for Maternal Health and Maternal Care. **Indian J Community Med.** 39.3 , p.132-7; 2014.
- HERDT, M.C.W. et al. Temporal Trend of Near Miss and its Regional Variations in Brazil from 2010 to 2018. **Rev. Bras. Ginecol. Obstet.**, Rio de Janeiro; v. 43, n. 2, p. 97-106; 2021
- KALE, Pauline Lorena et al. Neonatal near miss and mortality: factors associated with life-threatening conditions in newborns at six public maternity hospitals in Southeast Brazil. **Cadernos de Saúde Pública**, v. 33, n. 4, p.1-12, 2017.
- SAY, L. et al. Maternal *near miss*--towards a standard tool for monitoring quality of maternal health care. Best practice & research. **Clinical obstetrics & gynaecology** vol. 23,3; p. 287-96; 2009.
- WORLD HEALTH ORGANIZATION. Maternal Health. 2019. Available from: https://www.who.int/health-topics/maternal-health#tab=tab_1. Access on 14 Mar. 2021