






# Assistance process to women with severe maternal morbidity: a mixed study



*Processo assistencial às mulheres com morbidade materna grave: um estudo misto*

*Proceso asistencia: a mujeres con morbilidad materna grave: un estudio mixto*

Jessica Paola Garcia Villalba<sup>a</sup>   
 Adriana Lenho de Figueiredo Pereira<sup>b</sup>   
 Ana Beatriz Azevedo Queiroz<sup>c</sup>   
 Deise Breder dos Santos Batista<sup>a</sup>   
 Juliana Cristina Nascimento Guimarães<sup>a</sup> 

## How to cite this article:

Villalba JPG, Pereira ALF, Queiroz ABA, Batista DBS, Guimarães JCN. Assistance process to women with severe maternal morbidity: a mixed study. Rev Gaúcha Enferm. 2022;43:e20210046. doi: <https://doi.org/10.1590/1983-1447.2022.20210046.en>

## ABSTRACT

**Objective:** To describe the maternal and obstetric characteristics associated with severe maternal morbidity, and the factors of the assistance process involved in the severe outcomes according to nurses and doctors.

**Method:** Sequential mixed study at the tertiary maternity in the city of Rio de Janeiro, based on care records and interviews with these professionals, from February to July 2019. Chi-square test, prevalence ratio and thematic content analysis was applied.

**Results:** In 66 (100%) women with SMM, severe preeclampsia (77.3%) was more prevalent and there were 12 (18.2%) cases of near miss and one maternal death. Postpartum hemorrhage (PR = 3.21; 95% CI 1.22-8.41) and blood transfusions (PR = 3.60; 95% CI 1.81-7.16) contributed to severe outcomes. There are deficiencies in the health system, access to reproductive health and quality of care.

**Conclusion:** Improvements in access to health and quality of the care process are imperative to reduce severe maternal outcomes.

**Keywords:** Pregnancy complications. Morbidity. Quality of health care.

## RESUMO

**Objetivo:** Descrever as características maternas e obstétricas associadas à morbidade materna grave e os fatores do processo assistencial envolvidos nesses desfechos graves segundo enfermeiras e médicos.

**Método:** Estudo misto sequencial em maternidade terciária no município do Rio de Janeiro, a partir de registros da assistência e entrevistas com esses profissionais, de fevereiro a julho de 2019. Aplicaram-se teste qui-quadrado, razão de prevalência e análise de conteúdo temática.

**Resultados:** Em 66 (100%) mulheres, a pré-eclâmpsia grave (77,3%) foi mais prevalente e ocorreram 12 (18,2%) casos de *near miss* e um óbito materno. A hemorragia pós-parto (RP = 3,21; IC 95% 1,22-8,41) e realização de transfusões sanguíneas (RP = 3,60; IC 95% 1,81-7,16) contribuíram nos desfechos graves. Há deficiências no sistema de saúde, acesso à saúde reprodutiva e qualidade da assistência.

**Conclusão:** Melhorias no acesso à saúde e qualidade do processo assistencial são imperiosas para reduzir os desfechos maternos graves.

**Palavras-chave:** Complicações na gravidez. Morbidade. Qualidade da assistência à saúde.

## RESUMEN

**Objetivo:** Describir las características maternas y obstétricas asociadas a la morbilidad materna severa y los factores del proceso asistencial involucrados en estos resultados graves según enfermeras y médicos.

**Método:** Investigación secuencial mixta en una maternidad terciaria de la municipalidad de Río de Janeiro, a partir de los registros de atención y entrevistas con estos profesionales, de febrero a julio de 2019. Se aplicó prueba de chi-cuadrado, razón de prevalencia y análisis de contenido temático.

**Resultados:** En 66 (100%) mujeres, la preeclampsia grave (77,3%) fue más prevalente y hubo 12 (18,2%) casos de *near miss* y una muerte materna. La hemorragia posparto (RP = 3,21; IC del 95%: 1,22 a 8,41) y las transfusiones de sangre (RP = 3,60; IC del 95%: 1,81 a 7,16) contribuyeron en los resultados graves. Existen deficiencias en el sistema de salud, el acceso a la salud reproductiva y la calidad de la atención.

**Conclusión:** Mejoras en el acceso a la salud y calidad del proceso asistencial son imperativas para reducir los resultados maternos graves.

**Palabras clave:** Complicaciones del embarazo. Morbilidad. Calidad de la atención de salud.

<sup>a</sup> Universidade do Estado do Rio de Janeiro (UERJ), Programa de Pós-Graduação em Enfermagem, Curso de Mestrado. Rio de Janeiro, Rio de Janeiro, Brasil.

<sup>b</sup> Universidade do Estado do Rio de Janeiro (UERJ), Faculdade de Enfermagem, Departamento de Enfermagem Materno-Infantil. Rio de Janeiro, Rio de Janeiro, Brasil.

<sup>c</sup> Universidade Federal do Rio de Janeiro (UFRJ), Escola de Enfermagem Anna Nery, Departamento de Enfermagem Materno-Infantil. Rio de Janeiro, Rio de Janeiro, Brasil.

## INTRODUCTION

Severe maternal outcomes are related to three delays or lateness of women in accessing and receiving health care. The first delay is influenced by difficulty in decision making, as well as sociocultural and opportunity factors. The second delay is associated to the distance to the nearest health facility, travel time, availability and transport cost. The third delay involve factors that make it difficult for the woman who accesses the health unit to receive proper care, namely shortage of supplies, equipment and trained personnel; technical skills and availability of personnel and quality of care. This theoretical model (three delays model) is intended to assess the circumstances surrounding a maternal death<sup>(1-2)</sup>.

The study of severe maternal morbidity (SMM) is considered valuable for identifying possible failures in the care provided in health services and for guiding actions to reduce these severe outcomes<sup>(3-4)</sup>. SMM is defined as any potentially life-threatening condition of a woman during pregnancy, childbirth and the postpartum period, which can cause her death or near death. The latter condition, in which the woman survives, is classified as maternal near miss (MNM)<sup>(5)</sup>.

Pregnant women who have a potentially life-threatening condition tend to face barriers in their search for continuous care and in the referral system of the health care network. The main critical points that are obstacles to prenatal care are as follows: the fact that these women have to go to many health services to get proper assistance; the difficulty obtaining care in a timely manner and the delay in referral for a tertiary service<sup>(6)</sup>.

Given the difficulties associated with this type of care and its potential negative impact on maternal health, the following question was proposed: What are the maternal and obstetric characteristics and factors of the care process related to the outcomes of SMM?

The present study aimed to describe the maternal and obstetric characteristics associated with severe maternal morbidity and the care process factors involved in these severe outcomes according to nurses and physicians.

## METHODS

Study with an explanatory sequential mixed method design conducted in a public tertiary care maternity integrated to a teaching hospital in the city of Rio de Janeiro.

This maternity was selected because it is a referral center for high-risk pregnancies, which complements the services provided by state and municipal health care facilities in Rio de Janeiro and is a teaching hospital.

The explanatory sequential mixed design is characterized by the collection of quantitative data followed by qualitative data, which allows the integration of objective results about the factors associated with the severe maternal outcome with qualitative findings about the care process involved in this outcome, allowing a greater understanding of the phenomenon investigated<sup>(7)</sup>.

### Quantitative phase

Cross-sectional study based on records of care provided to women with high-risk pregnancies admitted to a specialized care unit (UCE) of the maternity, which has four beds intended for monitoring women with gestational pathology or severe obstetric complications.

In 2017, there were 354 births in this maternity, most of them by cesarean section (61.2%), according to information on live births (LB) from the Unified Health System (SUS). That year, 446 pregnant or postpartum women were seen in the emergency department of the maternity hospital and 107 of them were admitted to the specialized care unit, according to data provided by the health facility.

The inclusion criteria of the study were records of care provided to high-risk pregnant women who had SMM admitted to a tertiary care unit. Records of appointments due to serious conditions unrelated to the pregnancy period were excluded.

In the mixed study phase, data were collected from February to March 2019. A structured form was used to obtain data of interest related to appointments in 2017. This instrument was based on the identification form of life-threatening conditions and serious maternal outcomes proposed by the World Health Organization (WHO)<sup>(5)</sup>.

The period of the study was established based on the availability of access and consultation to paper documents from the medical records corresponding to the twelve months of care at the Specialized Care Unit, from January to December 2017, in the registry sector of the teaching hospital.

At first, a search was made in the records available in this registry sector, and 17 records were not found. Data from the 90 medical records found were extracted according to the structured form, and the selection criteria of the study were applied. Sixty-six (66) medical records of pregnant and postpartum women with SMM were selected, constituting the study sample. Data from 24 medical records were excluded because they did not meet these criteria.

The study variables are severe obstetric complications (severe postpartum hemorrhage; severe preeclampsia; eclampsia; sepsis or severe systemic infection and uterine

rupture); critical interventions (blood transfusion; uterine artery embolization; emergency abdominal surgery, except cesarean section, and admission to the Intensive Care Unit [ICU]); organic dysfunctions (cardiovascular; respiratory; renal; hematological; hepatic; neurological and uterine) and other maternal variables (age group, skin color, gestational age and schooling). The total number of prenatal consultations was not always available in the analyzed records. So, this variable was excluded due to the underreporting.

Severe maternal outcome, SMM and MNM, was investigated as a single variable due to the sample size. A Microsoft Office® Excel software spreadsheet, version 2013 was used in the analysis for the identification of MNM cases according to the World Health Organization criteria<sup>(5)</sup>, complemented by the criteria established by Mantel<sup>(8)</sup> and Geller<sup>(9)</sup>. The WHO parameters are considered the gold standard in the identification of potentially life-threatening conditions that lead to MNM, while Mantel parameters<sup>(8)</sup> are based on the definition of SMM as any severe organic dysfunction due to a primary obstetric cause. Geller's criteria<sup>(9)</sup> have a multiple approach and allow obtaining a score for the identification of MNM cases in more complex obstetric units. According to these criteria, MNM cases are recognized when 8 or more points out of a total of 15 points are present.

Despite the limitations of Mantel<sup>(8)</sup> and Geller's<sup>(9)</sup> parameters, both have good specificity and were developed based on an audit of medical notes and retrospectively<sup>(10)</sup>, like the design used in this phase of the study.

Statistical analysis was performed using the IBM SPSS® software, version 20.0, and agreement between Mantel<sup>(8)</sup> and Geller's<sup>(9)</sup> criteria was verified with the Kappa coefficient. The value obtained was 0.861. Chi-square test ( $\chi^2$ ) was then applied, with a significance level of  $p < 0.05$ , to test the association between the variables and the SMM/MNM outcome.

Bonferroni's *post hoc* test for multiple comparisons and controlling for type I error in the  $\chi^2$  test was used to identify the associations. Then, the strength of association between the independent variables and the outcome was verified using the Phi ( $\phi$ ) and Cramer's V tests. Finally, the Prevalence Ratio (PR) was calculated for each obstetric complication and critical intervention with a confidence interval of 95% (95% CI) and  $p$ -value  $< 0.05$  in the  $\chi^2$  test.

## Qualitative phase

Descriptive study with a qualitative approach, with nurses and physicians who work at the Specialized Care Unit (UCE) of the same maternity where the first phase of this mixed study was conducted.

Inclusion criteria were as follows: nurse or physician responsible for the care of pregnant or postpartum women with SMM. Professionals who have been performing their duties in the health facility for less than two years and those undergoing specialized training, such as medical and nursing residents, were excluded. These criteria are based on the fact that type of bond and length of time working in the institution are necessary information to assess the professional's familiarity with the care process of these women.

Therefore, an attempt was made to avoid mixing professionals from the permanent nursing and medical staff of the Specialized Care Unit with those in training for a short period in the sector. In-service training for residents generally lasts twenty-four months and is organized on a rotating basis by the outpatient clinic and tertiary maternity wards.

The group of professionals of interest to the study who worked in the Specialized Care Unit consisted of 13 nurses and 15 physicians at the time of data collection. Selection criteria were applied, and eleven professionals were excluded. The professionals selected to participate in the study were those of the permanent clinical staff of the Specialized Care Unit, and the representation of at least one professional from each occupation was also observed, according to the daily work shifts or the on-call schedule. None of the selected professionals refused to be interviewed.

Qualitative data were collected from April to July 2019. Prior to that, the purposes of the study were disclosed to the teams of nurses and physicians. The thirteen individual interviews with seven nurses and six doctors were recorded on digital media, supported by a guide divided into two parts. The first part concerned the characterization of the participants and the second contained questions about the care process of women with SMM. This guide was previously tested with four volunteers from the same professional occupations, and their interviews were later discarded. No modifications were necessary to any of the questions. The professionals who participated in the pilot test of the interview guide were not selected to participate in the study.

The interviews were analyzed using thematic content analysis technique<sup>(11)</sup>, consisting of pre-analysis interview data (testimonies) is transcribed and floating reading of this material is done followed by exploration of the material, which is performed with Microsoft Office Excel®, for grouping the meaning units by semantic equivalence. The frequencies of the recording units (RU) were verified, with coding consistent with the characterization and nature of the care process factors related to the occurrence of SMM. This phase was supervised by two researchers of the team who did not participate in data collection, culminating in the

construction of thematic categories or themes and their respective subthemes. Finally, the results were treated through inference and interpretation based on studies on the subject and the three delays model.

To preserve participants' anonymity, their names were replaced by a code according to their professional occupation, i.e. Nurse N1, Physician P2, etc. The study complied with regulations regarding research with human subjects and was approved by the concerned Research Ethics Committee.

## RESULTS

Of the 66 (100%) women with SMM most were aged 26-35 years (74.2%) had brown (39.4%) or black (33.3%) skin color, had completed secondary education (74.2%) and were in the last trimester of pregnancy (86.4%). There was a high prevalence in the number of pregnant women (95.5%) compared to postpartum women (4.5%).

As for the pregnant women, two (3%) had an ectopic pregnancy and seven (10.6%) had their pregnancies terminated, with one therapeutic abortion at the 17<sup>th</sup> week of pregnancy. In the other pregnant women, cesarean section was the main delivery outcome (71.2%), followed by normal delivery (15.1%) and instrumental delivery with forceps (6%). In one pregnant woman, the delivery was a twin birth with one infant born by vaginal delivery and the other by cesarean section. None of these maternal characteristics had a statistically significant result.

In the study sample, 12 (18.2%) women were found to have MNM, which corresponds to the MNM ratio of 34/1,000 LB, in reference to the 354 births that occurred at the institution in 2017. There was one (1.51%) maternal death in the postpartum period due to severe eclampsia and HELLP syndrome, which represents the 12:1 ratio of MNM events to maternal death. The summary of data for women with SMM/MNM can be seen in Table 1.

The prevalent severe complications were severe preeclampsia (77.3%), postpartum hemorrhage (18.2%) and sepsis (10.6%), with a statistically significant association for the SMM/MNM outcome by using  $\chi^2$  test. However, the strength of association by Cramer's V and Phi tests was weak for severe preeclampsia, postpartum hemorrhage and sepsis, and moderate for other serious complications related to surgical procedures.

As for frequent critical interventions, blood transfusion (27.3%), ICU admission (15.2%) and emergency abdominal surgery (10.6%) were also statistically significant using  $\chi^2$  test. The strength of association was moderate for ICU admission and weak for blood transfusion and emergency abdominal surgery.

The probability of a severe maternal outcome tends to increase with the occurrence of postpartum hemorrhage (PR= 3.21; 95% CI 1.22 – 8.41) and blood transfusions (PR= 3.60; 95% CI 1.81 – 7.16). This outcome was less likely in severe preeclampsia (PR= 0.38; 95% CI 0.17 – 0.85) and when other serious complications from surgical interventions occurred (PR= 0.58; 95% CI 0.36 – 0.94). The variables sepsis, ICU admission and emergency abdominal surgery were statistically significant using  $\chi^2$  test, but the confidence interval had a high amplitude and caused imprecision as to its effects on the outcome. These data can be seen in Table 2.

Seven nurses and six physicians participated in the qualitative phase of this mixed study. There were 11 female and two male participants. In view of this distribution by gender, with a huge predominance of women, professionals are here designated by the female gender.

The participants are specialists in the field of obstetrics, except for a nurse specialist in mental health; they have a mean age of 44 years, mostly in the 40-49 age group (10); and have been working in the maternity ward for in average 17 years, ranging from 5 to 25 years. All are public servants who integrate the institution's staff and are preceptors that provide guidance to medical and nursing students and residents.

Thematic content analysis enabled the construction of the theme "Factors of the care process associated with severe maternal morbidity", which includes four subthemes shown in Chart 1.

The deficiencies in the health care system emerged in the statements of nurses and physicians as one of the factors involved in SMM and concern the inadequate operating conditions of the public health network due to the lack of financial and material resources, poor working conditions of these professionals and the limited integration and coordination of services. The participants described a critical scenario in this health system, which triggers delays in the care of pregnant women at risk, as expressed in the following statements:

*I see a communication failure in the health network, which has primary, secondary and tertiary services, and there is a lack of integration in the network, of communication and follow-up of care [...] I think the lack of coordination in this network is the most obvious problem.*  
(Nurse N9)

*I think [that] the [health] network is very inadequate... it cannot function properly for political, economic and bureaucratic reasons. The state [of Rio de Janeiro] is facing a crisis and the municipality too [...] Health professionals are not getting paid, and this is totally inadequate [...]*  
(Nurse N4)

**Table 1** – Summary of data from women with severe morbidity according to the criteria used in the study. Tertiary public maternity (n=66). Rio de Janeiro, Rio de Janeiro, Brazil, 2017

<b>Criteria</b> <b>World Health Organization<sup>5</sup></b>	<b>N (%)</b>	<b>Criteria</b> <b>Mantel</b>	<b>N (%)</b>
Clinical criteria		Emergency hysterectomy	4 (6.0)
Severe postpartum hemorrhage	12 (18.2)	Hypovolemia – replacement of ≥ 5 units	3 (4.5)
Severe preeclampsia	51 (77.3)	Pulmonary edema	-
Eclampsia	3 (4.5)	Admission to Intensive Care Unit	10 (15.1)
Sepsis/severe systemic infection	7 (10.6)		1 (1.5)
Uterine rupture	-	Coagulation dysfunction	3 (4.5)
Critical interventions		Brain dysfunction	2 (3.0)
Admission to ICU	10 (15.1)	Respiratory dysfunction	3 (4.5)
Blood transfusions	18 (27.2)	Liver dysfunction	1 (1.5)
Uterine artery embolization	1 (1.5)		
Hysterectomy	4 (6.0)		
Other emergency surgical interventions in the abdominal cavity	11 (16.6)		
Organic dysfunctions		<b>Geller</b>	
Cardiovascular dysfunction	5 (7.5)	Organic failure	12 (18.2)
Respiratory dysfunction	3 (4.5)	Admission to the Intensive Care Unit	10 (15.1)
Kidney dysfunction	1 (1.5)	Blood transfusion of ≥ 3 units	10 (15.1)
Uterine dysfunction	4 (6.0)	Prolonged intubation (>12 h)	3 (4.5)
Hematological dysfunction	4 (6.0)	Surgical interventions	12 (18.2)
Liver dysfunction	1 (1.5)	Scoring	
Neurological dysfunction	2 (3.0)	Below 8	54 (81.8)
Management		8-9	6 (9.0)
Intubation and ventilation ≥ 60 minutes	3 (4.5)	10-11	2 (3.0)
Cardiopulmonary resuscitation	5 (7.5)	12-13	3 (4.5)
Vasoactive drugs	5 (7.5)	14-15	1 (1.5)
Blood transfusion of ≥ 5 units	3 (4.5)		
Hysterectomy	4 (6.0)		
Dialysis	1 (1.5)		

Source: Maternal records selected in the tertiary maternity ward of the teaching hospital

**Table 2** – Severe obstetric complications and critical interventions in women with severe morbidity and maternal near miss. Tertiary public maternity. Rio de Janeiro, Rio de Janeiro, Brazil, 2017

Variables	Maternal Morbidity			Cramer /Phi	PR	CI 95%
	Severe (n=54)	Near Miss (n=12)	Total			
	n (%)	n (%)	n (%)			
				<i>p</i>	<i>V/φ</i>	
Severe complication grave						
Postpartum hemorrhage	7 (10.6)	5 (7.6)	12 (18.2)	0.019	0.287	3.21 1.22 – 8.41
Severe preeclampsia	47 (71.2)	4 (6.1)	51 (77.3)	<0.001	0.494	0.38 0.17 – 0.85
Sepsis	3 (4.5)	4 (6.1)	7 (10.6)	0.005	0.348	6.00 1.54 – 23.77
Eclâmpsia	2 (3.0)	1 (1.5)	3 (4.5)	0.486	0.086	2.25 0.22 – 22.83
Other complications*	-	5 (7.6)	5 (7.6)	<0.001	0.607	0.58 0.36 – 0.94
Critical intervention						
Admission to ICU	2 (4.5)	8 (12.1)	10 (15.2)	<0.001	0.677	18.00 4.36 – 74.29
Emergency abdominal surgery	2 (3.0)	5 (7.6)	7 (10.6)	<0.001	0.476	11.25 0.24 – 51.22
Blood transfusion	10 (15.2)	8 (12.1)	18 (27.3)	0.001	0.417	3.60 1.81 – 7.16
Uterine artery embolization	-	1 (1.5)	1 (1.5)	0.030	0.263	- -

Source: Maternal records selected in the tertiary maternity ward of the teaching hospital.

Note: Bonferroni *post hoc* for all obstetric complications and critical interventions=  $p \leq 0.012$ .

Legend: \*Includes complications arising from remnants of ovular membranes after therapeutic abortion (1); wall hematoma after exploratory laparotomy (1); duodenal loop perforation during cesarean section (1); hysterorrhaphy dehiscence after cesarean section (1) and placental abruption with emergency cesarean section (1).

Theme	Subthemes	RU (%)
Care process factors associated with severe maternal morbidity	Deficiencies in the health care system	28,3
	Low quality of primary and hospital care	28.3
	Lack of professional training	25.2
	Low maternal socioeconomic status	12.8
	Difficulty in accessing reproductive health	5.4

**Chart 1** – Theme and subthemes of the study according to the percentage of the respective recording units. (n=187)

Source: The authors.



*I think that health care is in a very critical situation due to everything we are experiencing i.e. scarce resources, understaffing, many health units are being closed and others are overloaded. The SISREG [National Regulatory System must] also deserves mention. We depend on this system in referrals to specialists. And I think that this makes things more difficult too. (Nurse N10)*

The low quality of primary and hospital care was another factor in the care process related to SMM, according to the participants, as they report inadequacies in prenatal and childbirth care, such as the high turnover of professionals in the services, use of unnecessary interventions and inappropriate conducts that cause delays in access to the services and impair the quality of specialized and emergency care.

*These patients have now easy access to prenatal care, but somewhat the quality of prenatal care, is not good in Rio de Janeiro, because there is generally a high turnover of professionals. I'm talking about the nurses and doctors who provide prenatal care and, therefore, there is a weakness in care. Interventions in labor are generally unnecessary [...] Cesarean section is another factor that increases the risk of morbidity and infection, and so on. (Physician P13)*

*[...] these pregnant women often have access to care at a more advanced gestational age, as the risk was not detected early [...]. So they arrive here in a more serious condition and go directly to the Specialized Care Unit (UCE), get worse and then go to the ICU. It's just that, sometimes, [...] they are seen at the service by a professional with little experience in high-risk care, and the situation gets worse. (Nurse N3)*

The respondents believe that inadequate professional training also contributes to the SMM outcome, as it involves deficiencies in the professional's knowledge and skills to be able to recognize the risk and carry out interventions and emergency management for pregnant women at risk.

*There are many teams of preventive medicine healthcare professionals, but they do not have the necessary knowledge. If they had adequate training, they could better identify the patients at risk and refer them to a secondary or tertiary service [...], providing professionals with at least training to recognize this risk can improve and further impact the quality of prenatal care (Physician P8)*

*There is a lack of adequate assistance during labor because in obstetric emergency, rapid response is needed. The first few hours are crucial. I think that the main reason*

*for this is the lack of qualification of professionals. Most maternal deaths could be avoided with good medical care. I think this is the key factor here. (Physician P6)*

The participants stressed that low maternal socioeconomic status contributed to the occurrence of SMM, as the difficulties in accessing health services, the lack of resources and social and intrafamily support of pregnant women restricted their access to health care and to a continuous care process.

*Many women live far from the city of Rio de Janeiro and have difficulty accessing health services, and this even more difficult because of their financial problems and also because they have no one to watch their children. (Nurse N1)*

*They [pregnant women] are much more vulnerable. In prenatal care, they are often referred to high-risk [care] in facilities far from their homes. They have serious social problems. So, [...] they do not have the financial conditions to attend [the risk prenatal unit]. Thus, there are many hospitalizations in an attempt to provide the care that cannot be provided at the outpatient level. (Physician, P11)*

The difficulty in accessing reproductive health emerged in the participants' statements. It involves many situations that contribute to the occurrence of SMM, related to obstacles to the prevention of unplanned pregnancy and unsafe abortion, the fact that pregnant women have to go to various facilities to get assistance, little availability and lack of regulation of maternal ICU beds in the health system.

*I think the main factor is unplanned pregnancy [...] because here in Brazil we have a large number of abortions that are not permitted by law. [...] It is often an important factor. So, this has to do with family planning, with unplanned pregnancies and with the education of the people in general. (Physician P12)*

*[...] the fact that patients seek various health services, we know that this happens [...], sometimes they cannot access the [health] network or else they start prenatal care at a given health unit, then migrate to another health unit and feel a little confused or, sometimes, they wait for a transfer to the hospital. (Nurse N10)*

*ICU beds is a big problem in Brazil Sometimes we need them but can't get them. Then, we have to request ICU beds through the Access Regulation Center. At other times, we get them right here. So, the fact that there is an ICU*

*here [at the teaching hospital] does not mean that we will get the ICU bed when we need it. (Physician P11)*

## DISCUSSION

Obstetric complications diagnosed late and inadequately treated result in dangerous and life-threatening situations for women, especially in the context of poverty, social inequality and deficiencies in the health care network. Social inequality impacts the health of the general population, but it particularly affects women due to gender inequities that sometimes overlap with racial inequalities, and both have negative and synergistic effects on health access and outcomes<sup>(1-5)</sup>.

In the present study, maternal characteristics were not associated with the severe outcome investigated. However, the testimonies of physicians and nurses clarify the profile of pregnant women assisted at the Specialized Care Units (UCE) of the maternity and reveal that some women have low socioeconomic status, they often can't find someone to watch their children when they seek care or undergo follow-up care in health facilities, and they cannot afford to pay for transport to the health service because they live far from the reference unit. Therefore, social vulnerabilities and barriers to accessing health services can increase the risk of adverse outcomes<sup>(1,12)</sup>.

Prenatal coverage in Brazil is almost universal (above 98%), but the difficulty for many women to attend the recommended minimum number of six prenatal consultations increases the risk of MNM<sup>(3)</sup>. This risk for MNM is increased when pregnant women need to seek two or more hospitals for labor care<sup>(12)</sup>. Delay in obstetric care causes serious maternal outcomes, and it was observed in 53.9% of the women who had SMM and died in 27 Brazilian hospitals. In the group with MNM, the prevalence of delays was above 68%<sup>(2)</sup>. Difficulties in referral and transfer of pregnant women are the main barriers to obtaining emergency care<sup>(2,13)</sup>, as the nurses and physicians participating in the study pointed out.

Delays increase the risk of complications associated with SMM/MNM. Severe preeclampsia was the most prevalent complication (77.3%), followed by postpartum hemorrhage, eclampsia and sepsis in this study. Hypertensive conditions are more frequent in women with SMM in Brazil, corresponding to 67% of cases<sup>(2,13)</sup>. Globally, hemorrhage tends to predominate over hypertensive disorders of pregnancy and sepsis<sup>(1,9,13)</sup>.

Regarding MNM cases, a systematic review found that hemorrhage was the most reported cause in the studies, being an important risk factor for severe events<sup>(13)</sup>. Therefore, pregnant women with obstetric complications should

receive adequate and timely care to prevent unwanted outcomes. In contrast, women faced with the third delay in emergency care find insufficient supply of services and low quality of care<sup>(1-2)</sup>.

Delays related to poor quality of care at the tertiary level have significant impact in severe maternal outcomes, and health personnel failures explain much of the inadequacy of maternal care. On the other hand, the third delay is multifactorial and includes the deficiencies of the health system, such as budget deficit; lack of supplies, inputs and personnel; logistics problems; low technical competence of professionals, among others<sup>(1-2,14)</sup>. According to the physicians and nurses who participated in the study, some of these factors were decisive to the failures of the care process.

Considering these factors involved in the third delay, the clientele assisted at the tertiary maternity hospital seems to have been particularly affected by the context of crisis in the local health system, according to the professionals interviewed. An austerity budget policy tends to harm the performance of the health system and cause a retraction in the provision of services, with a drop in coverage in primary care, outpatient production, total hospitalizations, number of beds and surgeries performed, as well as an increase in the waiting time for ambulances, exams and outpatient consultations<sup>(15)</sup>.

Despite the impossibility of comparing the data described here with the results of prospective and population-based studies, the MNM ratio of 34/1000 LB and the 12:1 ratio of near miss events due to maternal death in the health institution where the study was conducted are consistent with the indicators found in studies from hospitals in the Northeast region of Brazil<sup>(3-4)</sup>. However, these indicators are higher than those observed in reference maternity units in Brazil<sup>(2)</sup>, suggesting the possibility that the context of crisis in the local health system has negative effects on the care process of pregnant women and increases the risk of severe maternal outcomes, which should be investigated.

The present mixed study elucidates the delays resulting from the deficiencies of the health system, including the reference and regulation of vacancies for ICU beds for pregnant women with SMM, as explained by the professionals interviewed. At the national level, it is known that there are limitations in the supply of beds and specialized professionals in the ICU in relation to the demands of hospitalizations in the country<sup>(16)</sup>, as well as weaknesses in the system of regulation of vacancies in some municipalities due to failures in the criteria for patients referral, low availability of beds, difficulties in the flow of information between primary care and the regulation of vacancies, among other obstacles<sup>(17)</sup>. However, women with SMM require more complex care and



when organ dysfunction and failure occur, ICU treatment can mean the difference between survival and death.

Another problem underlying the obstetric conditions associated with SMM is abortion. Its repercussions were reported in the statements of physicians and nurses. It is estimated that about 9% of hospital admissions for abortion are followed by an MNM event and that approximately 1.5% of cases end in death<sup>(18)</sup>. Thus, the urgency of implementing actions in reproductive health is highlighted, aimed to reduce SMM and deaths related to unwanted or unplanned pregnancy<sup>(19)</sup>.

Although abortion is relevant in maternal morbidity and mortality in the country, discourses and initiatives based on conservative moralities contrary to gender equity policies and sexual and reproductive rights can jeopardize the advances made in recent decades and impose barriers to programs for the prevention of unplanned pregnancy and unsafe abortion, as well as to actions aimed at guaranteeing women's rights, including legal abortion<sup>(19)</sup>.

In addition to these structural and political problems in health care, the study described here found a statistically significant association between the outcome investigated and obstetric complications related to surgical interventions, such as those resulting from wall hematoma, duodenal loop perforation, and hysterorrhaphy dehiscence, indicating that adverse care events can contribute to negative outcomes. As the tertiary maternity where the study was conducted integrates a teaching hospital, the occurrence of these events requires improvements in care safety, team training and supervision of health personnel in training, such as medical and nursing residents, in order to reduce damage resulting from operative procedures.

The quality of hospital care is a key factor for successful health outcomes. Inexperience and inadequate professional training contribute to severe outcomes related to emergency maternal care<sup>(1-2)</sup>. Professional problems are involved in 40% of obstetric complications and corroborate the low quality of hospital care, such as lack of technical skills; late diagnoses; inappropriate behavior and low adherence to care protocols. The availability, skills and attitudes of health personnel are recognized as the main barriers to proper emergency care<sup>(20)</sup>.

Therefore, a set of maternal, care and health system factors are involved in the three delays and seem to act synergistically in the inadequacies of the care process related to the occurrence of SMM and MNM, which here proved to be delays derived from low social conditions of the mothers, barriers in access to health services and weaknesses in the quality of care for pregnant women at the primary and hospital levels.

## ■ FINAL CONSIDERATIONS

The lives of pregnant women must be a priority of society and public policies, as well as a concern of all actors and segments involved in the health area. Therefore, efforts to improve the health care network; qualification of primary care for timely diagnosis and intervention of maternal risks; improvement of sexual and reproductive health actions; expansion and qualification of referral services for pregnant women at risk; increased supply and guarantee of hospitalization in ICU beds; and professional training for emergency assistance in obstetrics are recommended.

It is also recommended to raise the awareness of managers and health professionals, together with medical and nursing professors and students to actively seek strategies to reduce delays in health care opportunities, and to dedicate efforts to improve the quality and safety of obstetric and emergency care for pregnant women with complications associated with SMM.

Finally, it should be noted that the results described here must be considered with caution and within the limits imposed by the methodological design and by analyzes based on records of a small sample of women with SMM and the perspectives of professionals from a single referral service. The limitations of the study associated to lack of data on the number of prenatal consultations should also be mentioned, which made it impossible to verify associations with the SMM outcome in the study sample.

Despite the above limitations, this mixed study was able to shed light on the factors that contribute to the occurrence of severe maternal outcomes, as well as elucidate some challenges and critical points of the health system, which is consistent with the current context that seeks to restrict women's health care and reproductive rights.

## ■ REFERENCES

1. Mgawadere F, Unkels R, Kazembe A, van den Broek N. Factors associated with maternal mortality in Malawi: application of the three delays model. *BMC Pregnancy Childbirth*. 2017;17(1):219. doi: <https://doi.org/10.1186/s12884-017-1406-5>
2. Pacagnella RC, Cecatti JG, Parpinelli MA, Sousa MH, Haddad SM, Costa ML, et al. Delays in receiving obstetric care and poor maternal outcomes: results from a national multicentre cross-sectional study. *BMC Pregnancy Childbirth*. 2014;14:159. doi: <https://doi.org/10.1186/1471-2393-14-159>
3. Lima THB, Amorim MM, Buainain Kassab S, Katz L. Maternal near miss determinants at a maternity hospital for high-risk pregnancy in northeastern Brazil: a prospective study. *BMC Pregnancy Childbirth*. 2019;19(1):271. doi: <https://doi.org/10.1186/s12884-019-2381-9>
4. Rosendo TM, Roncalli AG. Near miss materno e iniquidades em saúde: análise de determinantes contextuais no Rio Grande do Norte, Brasil. *Ciênc Saúde Colet*. 2016;21(1):191-201. doi: <https://doi.org/10.1590/1413-81232015211.20802014>

5. World Health Organization. Evaluating the quality of care for severe pregnancy complications – The WHO near-miss approach for maternal health [Internet]. Geneva: WHO; 2011 [cited 2021 Mar 5]. Available from: [http://apps.who.int/iris/bitstream/handle/10665/44692/9789241502221\\_eng.pdf;jsessionid=79A12B5B52EAE7B7D067820ADE185362?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/44692/9789241502221_eng.pdf;jsessionid=79A12B5B52EAE7B7D067820ADE185362?sequence=1)
6. Andrade MS, Vieira EM. Itinerários terapêuticos de mulheres com morbidade materna grave. *Cad Saúde Pública*. 2018;34(7):e00091917. doi: <https://doi.org/10.1590/0102-311X00091917>
7. Ivankova N, Wingo N. Applying mixed methods in action research: methodological potentials and advantages. *Am Behav Sci*. 2018;62(7):978-97. doi: <https://doi.org/10.1177/0002764218772673>
8. Mantel GD, Buchmann E, Rees H, Pattinson RC. Severe acute maternal morbidity: a pilot study of a definition for a near-miss. *Br J Obstet Gynaecol*. 1998;105(9):985-90. doi: <https://doi.org/10.1111/j.1471-0528.1998.tb10262.x>
9. Geller SE, Rosenberg D, Cox S, Brown M, Simonson L, Kilpatrick S. A scoring system identified near-miss maternal morbidity during pregnancy. *J Clin Epidemiol*. 2004;57(7):716-20. doi: <https://doi.org/10.1016/j.jclinepi.2004.01.003>
10. Monte AS, Teles LMR, Oriá MOB, Carvalho FHC, Brown H, Damasceno AKC. Comparison between near miss criteria in a maternal intensive care unit. *Rev Esc Enferm USP*. 2018;52:e03404. doi: <https://doi.org/10.1590/S1980-220X2017038703404>
11. Ferreira AMD, Oliveira JLC, Souza VS, Camillo NRS, Medeiros M, Marcon SS, et al. Roteiro adaptado de análise de conteúdo – modalidade temática: relato de experiência. *J Nurs Health*. 2020;10(1):e20101001. doi: <https://doi.org/10.15210/jonah.v10i1.14534>
12. Domingues RMSM, Dias MAB, Schilithz AOC, Leal MC. Factors associated with maternal near miss in childbirth and the postpartum period: findings from the birth in Brazil National Survey, 2011–2012. *Reprod Health*. 2016;13(Suppl 3):115. doi: <https://doi.org/10.1186/s12978-016-0232-y>
13. Monte AS, Mendes IC, Oriá MOB, Carvalho FHC, Brown H, Damasceno AKC. Near miss maternal: influencing factors and guidelines for reducing maternal morbidity and mortality. *Rev Rene*. 2018;19:e3182. doi: <https://doi.org/10.15253/2175-6783.2018193182>
14. García-Tizón Larroca S, AmorValera F, Ayuso Herrera E, Cueto Hernandez I, Cuñarro Lopes Y, De Leon-Luis J. Human development index of the maternal country of origin and its relationship with maternal near miss: a systematic review of the literature. *BMC Pregnancy Childbirth*. 2020;20(1):224. doi: <https://doi.org/10.1186/s12884-020-02901-3>
15. O'Dwyer G, Graever L, Britto FA, Menezes T, Konder MT. Financial crisis and healthcare: the case of the municipality of Rio de Janeiro, Brazil. *Ciênc Saúde Colet*. 2019;24(12):4555-68. doi: <https://doi.org/10.1590/1413-812320182412.23212019>
16. Soares FM, Guida JP, Pacagnella RC, Souza JP, Parpinelli MA, Haddad SM, et al. Use of intensive care unit in women with severe maternal morbidity and maternal death: results from a national multicenter study. *Rev Bras Ginecol Obstet*. 2020;42(3):124-32. doi: <https://doi.org/10.1055/s-0040-1708095>
17. Bastos LBR, Barbosa MA, Rosso CFW, Oliveira LMAC, Ferreira IP, Bastos DAS, et al. Practices and challenges on coordinating the Brazilian Unified Health System. *Rev Saude Publica*. 2020;54:25. doi: <https://doi.org/10.11606/s1518-8787.2020054001512>
18. Calvert C, Owolabi OO, Yeung F, Pittrof R, Ganatra B, Tunçalp Ö, et al. The magnitude and severity of abortion-related morbidity in settings with limited access to abortion services: a systematic review and meta-regression. *BMJ Glob Health*. 2018;3(3):e000692. doi: <https://doi.org/10.1136/bmjgh-2017-000692>
19. Zanatta LF, Grein MI, Álvarez-Dardet C, Moraes SP, Brêtas JRS, Ruiz-Cantero MT, et al. Gender equality: why is Brazil moving backwards? *Cad Saúde Pública*. 2016;32(8):e00089616. doi: <https://doi.org/10.1590/0102-311X00089616>
20. Hussein J, Hirose A, Owolabi O, Imamura M, Kanguru L, Okonofua F. Maternal death and obstetric care audits in Nigeria: a systematic review of barriers and enabling factors in the provision of emergency care. *Reprod Health*. 2016;13:47. doi: <https://doi.org/10.1186/s12978-016-0158-4>

■ **Acknowledgment:**

We thank the Coordination for the Improvement of Higher Education Personnel – Brazil (CAPES) – Financing Code 001

■ **Authorship contribution:**

Conceptualization: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira, Ana Beatriz Azevedo Queiroz, Deise Breder dos Santos Batista, Juliana Cristina Nascimento Guimarães.

Data curation: Jessica Paola Garcia Villalba.

Formal analysis: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira, Ana Beatriz Azevedo Queiroz.

Acquisition of funding: Jessica Paola Garcia Villalba.

Investigation: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira.

Methodology: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira, Ana Beatriz Azevedo Queiroz.

Project management: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira.

Resources: Jessica Paola Garcia Villalba.

Software: Jessica Paola Garcia Villalba.

Visualization: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira, Ana Beatriz Azevedo Queiroz, Deise Breder dos Santos Batista, Juliana Cristina Nascimento Guimarães.

Supervision: Adriana Lenho de Figueiredo Pereira.

Writing – original draft: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira, Ana Beatriz Azevedo Queiroz, Deise Breder dos Santos Batista, Juliana Cristina Nascimento Guimarães.

Writing – review and editing: Jessica Paola Garcia Villalba, Adriana Lenho de Figueiredo Pereira, Ana Beatriz Azevedo Queiroz.

The authors declare that there is no conflict of interest.

■ **Corresponding author:**

Jessica Paola Garcia Villalba  
E-mail: yeco0910@gmail.com

Received: 03.08.2021  
Approved: 11.16.2021

**Associate editor:**

Helga Geremias Gouveia

**Editor-in-chief:**

Maria da Graça Oliveira Crossetti