Revista Contexto & Saúde
Editora Unijuí
Programa de Pós-Graduação em Atenção Integral à Saúde
ISSN 2176-7114 – v. 24, n. 48, 2024
http://dx.doi.org/10.21527/2176-7114.2024.48.14177
HOW TO CITE:
Mendes GLR de S, Cunha MS, Reis COF, Matricardi JL das N, de Freitas SLF. Epidemiological profile of maternal mortality in the health macro-regions of Mato Grosso do Sul, 2011-2019. Rev. Contexto & Saúde, 2024;24(48):e14177.

ORIGINAL ARTICLE

Epidemiological Profile of Maternal Mortality in the Health Macro-Regions of Mato Grosso do Sul, 2011-2019

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Highlights:

(1) Despite the reduction in the maternal mortality ratio in Mato Grosso do Sul, the rate is still high. (2) Maternal deaths are prevalent in the macro-region of Campo Grande between 20 and 39 years, with 8 to 11 years of study, single/separated, in the hospital, due to direct causes and during the puerperium up to 42 days. (3) Reduction of maternal mortality can be achieved with qualification and expansion of care at the primary level of health care.

ABSTRACT

***Objective*:** To describe the maternal mortality in the health macro-regions of Mato Grosso do Sul from 2011 to 2019. ***Methods*:** Descriptive and cross-sectional study of reported cases of maternal mortality in the state of Mato Grosso do Sul and its health macro-regions from 2011 to 2019. Data were extracted by accessing the Mortality Information System data source. Data on age group, education, color, marital status, place of occurrence, cause and pregnancy-puerperal period were stored in Microsoft Excel sheets. The Maternal Mortality Ratio was calculated for each macro-region. ***Results*:** 237 maternal deaths were identified, with 46.0% in the macro-region of Campo Grande, 32.5% in Dourados, 11.4% in Três lagoas and 10.1% in Corumbá. There were 391,171 live births in the state of Mato Grosso do Sul and the maternal mortality rate in this period was 60.6/100,000 live births. ***Conclusion*:** Maternal mortality numbers remain high and the maternal mortality coefficient is classified as very high. Despite advances in improving obstetric care and the existence of public health policies, the number of deaths that could be prevented with the use of simple technologies at the primary level of health care to identify complications remains alarming.

Keywords: maternal mortality; pregnancy; postpartum period; maternal and child health.

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INTRODUCTION

Maternal mortality (MM) is defined as the death of a woman during the gestational period or after 42 days and can be categorized into direct or indirect causes[1]. Direct MM is one that occurs due to complications in the pregnancy-puerperal period, due to interventions, omissions, incorrect treatment or a chain of events resulting from any of these. Indirect MM results from diseases pre-existing to pregnancy or that develop during this period and are aggravated by the physiological adaptations of the body to pregnancy[2].

MM has been changing over the years due to the improvement in women's access to health and the monitoring of health professionals during the pregnancy-puerperal cycle through prenatal care and nursing consultations[3].

In the global context, MM has decreased from 339 to 223 per 100,000 live births from 2000 to 2020 (34.3% reduction), a total of 287,000 maternal deaths were recorded in 2020[4]. In 2017, in Brazil, the maternal mortality rate was 56.65 (the lowest rate since 2013)[5]. That same year, Mato Grosso do Sul presented a rate above the national mean, with 64.84. Despite the high value, it still represents a decrease compared to previous years. In 2016 the rate was 80.13[5]. Another study conducted in the state found a very high mean for indigenous and black races/color, 162.3 and 186.3, respectively, per 100,000 live births between 2010 and 2015[6].

To achieve the Sustainable Development Goals (SDGs) adapted to the Brazilian reality, the country needs to reach a maximum total of 30 per 100,000 live births by 2030[7]. Policy development guidelines aimed at reducing MM face the challenge related to reporting issues and especially the investigation of new cases. The quality of filling in maternal deaths has been pointed out in Brazil, a fact that makes it difficult to monitor cases and adopt measures to prevent new cases[8].

Statistically evaluating maternal mortality is extremely important as a method of health indicator of this specific population in Brazil, as this index is fully linked to the quality of life of the notified region, especially on the quality of health care. These data enable the construction of public policies aimed at reducing the high rates of MM[9].

Much has been said about reducing the rate (or ratio) of MM, but there are few results. It is observed that its occurrence reflects the quality of life of people in a given region and the access of women to health care and the capacity of the health system to respond adequately to their needs. MM is a public health problem and expresses inequity and inequality in care and lack of female empowerment[10].

In the period between 1996 and 2018, the Mortality Information System (MIS) recorded 39,000 maternal deaths. Between 1990 and 2001 MMR decreased from 141.0 to 80.0/100,000 LB, in 2015 MMR was 59.1 deaths per 100,000 live births (LB). It is important to consider the existing underreporting. The inadequate registration of maternal deaths may be related to the incorrect completion of the Death Certificate and the declaration of the cause of death, among others[7].

Although Brazil has managed to reduce MM rates in recent years, they are still high and constitute a violation of the rights of women and children. Coping with this problem requires articulation between different social factors to ensure that public policies are implemented and consistent with the needs of the local population[11]. The objective of this study is to describe the cases of maternal mortality reported in the health macro-regions in Mato Grosso do Sul (MS) from 2011 to 2019.

METHOD

This is a cross-sectional, descriptive, quantitative study with secondary data in the public domain. The research location is the State of Mato Grosso do Sul (MS), located in the central-west region of Brazil with an estimated population of 2,839,188 people in 2021 and has 79 municipalities according to the Brazilian Institute of Geography and Statistics (IBGE).

Notified cases of MM were included in the period from 2011 to 2019 in the State of Mato Grosso do Sul, extracted through access to the Mortality Information System (MIS) data source (http://tabnet.datasus.gov.br/cgi/deftohtm.exe?yes/cnv/mat10ms.def).

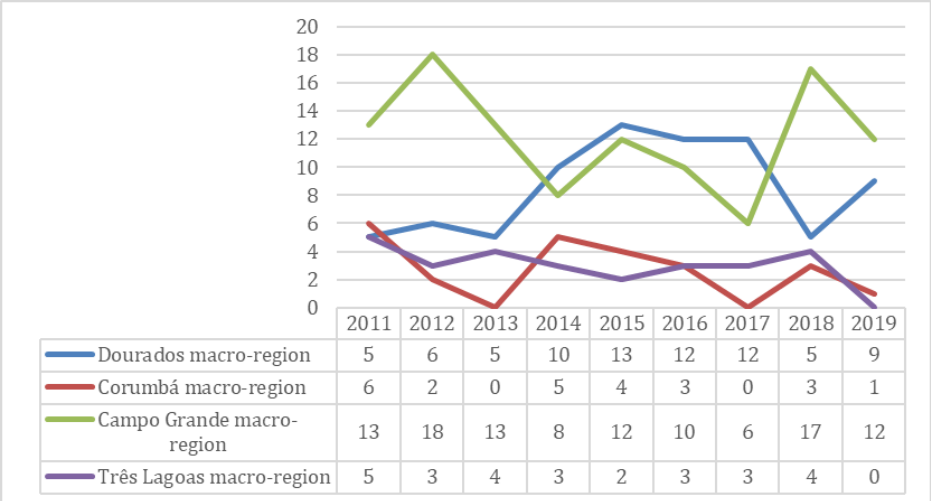
The study variables were selected: age group, education, color, marital status, place of occurrence, cause, pregnancy-puerperal period and exported directly from the system in CSV format/extension, which is compatible with Microsoft Excel.

To calculate the Maternal Mortality Ratio (MMR), the number of maternal deaths was used, divided by the total LB of mothers residing in the same place and period x 100,000. The LB numbers were extracted from the Live Birth Information System (SINASC). For classification into low, medium, high and very high, the parameters of the Committee on Maternal Mortality (CMM) of the World Health Organization[12] were used.

For data processing and analysis, spreadsheets were built on Microsoft Excel Office software version 2019. Descriptive analysis and characterization of the studied population were performed based on the frequency distribution of the selected variables, calculation of mean, standard deviation and proportions, to evaluate the profile of the research subjects. The use of secondary data in the public domain does not require consideration by the ethics committee in accordance with resolution number 466/2012.

RESULTS

In the period analyzed from 2011 to 2019, a total of 237 maternal deaths were observed. Of these, they were divided among the health macro-regions: Campo Grande with 109 (46.0%), Dourados with 77 (32.5%), Três Lagoas with 27 (11.4%) and Corumbá with 24 (10.1%). Graph 1 shows the number of deaths per year in each macro-region.

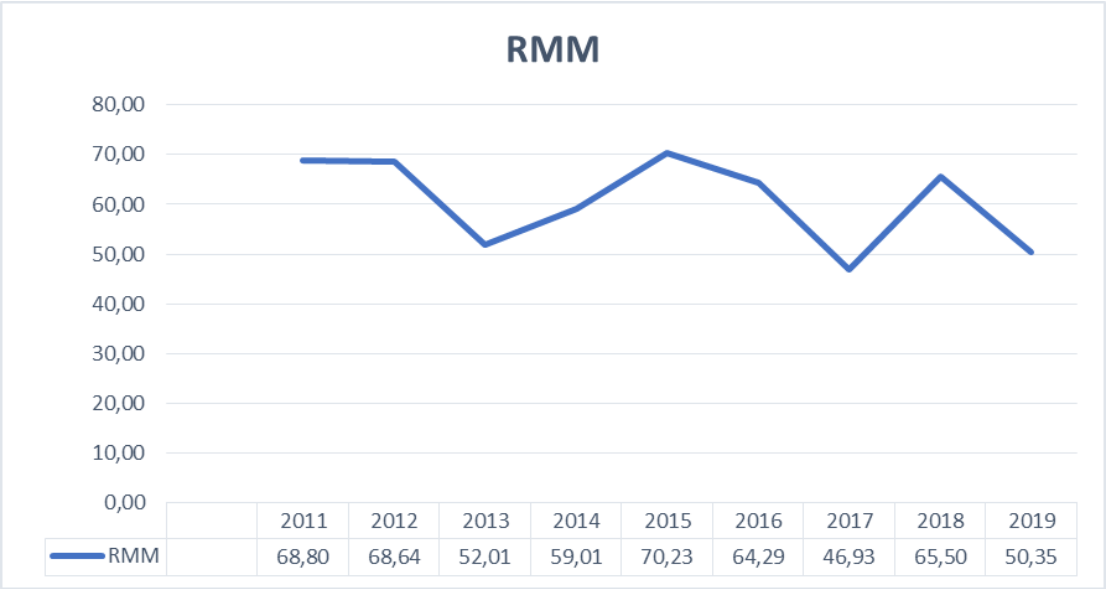


	2011	2012	2013	2014	2015	2016	2017	2018	2019
Dourados macro-region	5	6	5	10	13	12	12	5	9
Corumbá macro-region	6	2	0	5	4	3	0	3	1
Campo Grande macro-region	13	18	13	8	12	10	6	17	12
Três Lagoas macro-region	5	3	4	3	2	3	3	4	0

Graph 1 – Number of maternal deaths in Mato Grosso do Sul by macro-region, 2011-2019 (N=237). Brazil, 2023.

Source: Prepared by the authors.

A total of 391,171 LB were registered in the state of Mato Grosso do Sul. The MMR in the same period was 60.6/100,000 LB. It was found that the years in which the MMR was higher were: 2015, 2011, 2012, 2018 and 2016. And the year with the lowest MMR was 2017 as shown in Graph 2.

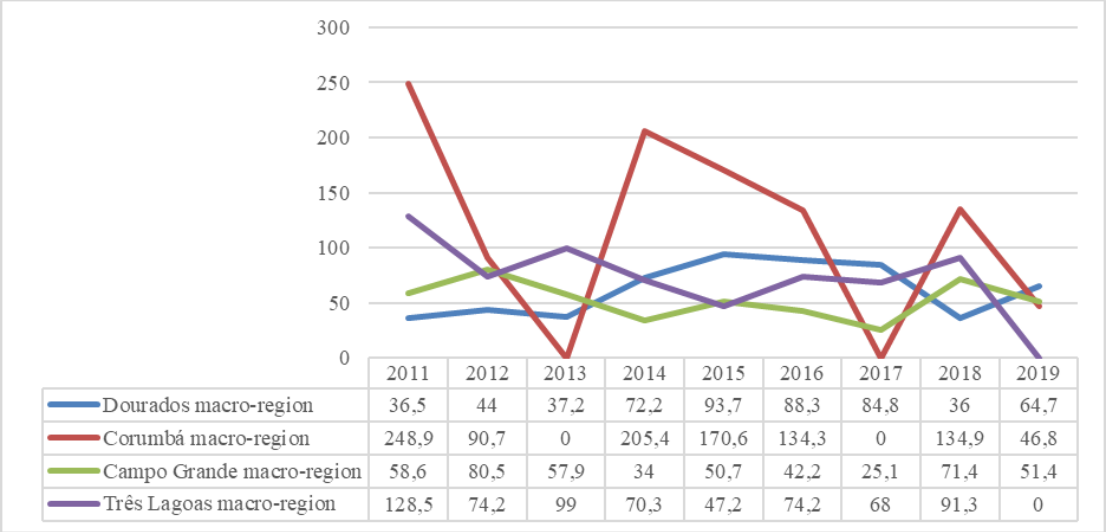


	2011	2012	2013	2014	2015	2016	2017	2018	2019
RMM	68,80	68,64	52,01	59,01	70,23	64,29	46,93	65,50	50,35

Graph 2 – Maternal Mortality Ratio between 2011 and 2019. Brazil, 2023.

Source: Prepared by the authors.

In the analyzed period, the MMR was high, especially in 2011 (248/100,000 LB), 2014 (205/100,000LB) and 2015 (170/100,000LB) as very high for the macro-region of Corumbá, which obtained a decrease in the index to mean only in 2019 (46.7/100,000LB). In Dourados, the mean ratio remained in 2011, 2012, 2013 and 2019 and in the other years the ratio was high. Campo Grande presented mean index only in 2014, 2016 and 2017 and Três Lagoas in 2015 as shown in Graph 3.



	2011	2012	2013	2014	2015	2016	2017	2018	2019
Dourados macro-region	36,5	44	37,2	72,2	93,7	88,3	84,8	36	64,7
Corumbá macro-region	248,9	90,7	0	205,4	170,6	134,3	0	134,9	46,8
Campo Grande macro-region	58,6	80,5	57,9	34	50,7	42,2	25,1	71,4	51,4
Três Lagoas macro-region	128,5	74,2	99	70,3	47,2	74,2	68	91,3	0

Graph 3 – Maternal Mortality Ratio in Mato Grosso do Sul by Health Macroregion, 2011-2019. Brazil, 2023.

Source: Prepared by the authors.

Table 1 describes the characterization of maternal deaths according to the variables studied, with emphasis on the macro-region of Campo Grande, in the age group of 20 to 39 years, with 8 to 11 years of study time, black/brown, single/separated, occurred in the hospital, due to direct causes, during pregnancy, delivery or abortion and during the puerperium.

Table 1 – Characterization of maternal deaths according to the Health Macro-region, 2011-2019. Brazil, 2023

Variables	Campo Grande n = 109	Dourados (n=77)	Três Lagoas (n=27)	Corumbá (n=24)	Total (n=237)
	n (%)	n (%)	n (%)	n (%)	n (%)
Age group (years)					
10 to 14	4 (80.0)	1 (16.7)	0 (0.0)	0 (0.0)	5 (2.1)
15 to 19	12 (40.0)	15 (50.0)	0 (0.0)	3 (10.0)	30 (12.7)
20 to 29	45 (43.7)	26 (25.2)	18 (17.5)	14 (13.6)	103 (43.5)
30 to 39	42 (48.8)	30 (34.9)	8 (9.3)	6 (7.0)	86 (36.3)
40 to 49	6 (46.2)	5 (38.5)	1 (7.7)	1 (7.7)	13 (5.5)
Education (years)					
None	2 (22.2)	5 (55.6)	1 (11.1)	1 (11.1)	9 (3.8)
1 to 7	32 (39.5)	29 (35.8)	11 (13.6)	9 (11.1)	81 (34.2)
8 - 11	56 (50.5)	32 (28.8)	10 (9.0)	13 (11.7)	111 (46.8)
12 or more	11 (45.8)	7 (29.2)	5 (20.8)	1 (4.2)	19 (10.1)
NI*	8 (67.7)	4 (33.3)	0 (0.0)	0 (0.0)	12 (5.1)
Color/race					
Black/brown	68 (48.6)	28 (40.0)	9 (12.9)	1 (1.4)	70 (29.5)
White	32 (45.7)	31 (22.1)	18 (12.90)	23 (16.4)	140 (59.1)
Indigenous	8 (30.8)	18 (69.2)	0 (0.0)	0 (0.0)	26 (11.0)
Not informed*	1 (100)	0 (0.0)	0 (0.0)	0 (0)	1 (0.4)
Marital Status					
Single/separated	68 (49.6)	38 (27.7)	12 (8.8)	19 (13.9)	137 (57.8)
Married	29 (43.9)	24 (36.4)	10 (15.2)	3 (4.5)	66 (27.8)
NI*	12(35.3)	15 (44.1)	5 (14.7)	2 (5.9)	34 (14.3)
Occurrence location					
Hospital	96 (44.7)	70 (32.6)	26 (12.1)	23 (10.7)	215 (90.7)
Health Establishment	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	2 (0.8)
Dwelling-place	10 (83.3	2 (16.7)	0 (0.0)	0 (0.0)	12 (5.1)
Public road	0 (0.0)	4 (80.0)	0 (0.0)	1 (20.0)	5 (2.1)
NI*	2 (66.7)	0 (0.0)	1 (33.3)	0 (0.0)	3 (1.3)
Obstetric cause					
MM direct obstetric	71 (44.9)	56 (35.4)	18 (11.4)	13 (8.2)	158 (66.7)
MM Indirect obstetric	37 (50.0)	18 (24.3)	8 (10.8)	11 (14.9)	74 (31.2)
NI*	1 (20.0)	3 (60.0)	1 (20.0)	0 (0.0)	5 (2.1)
Pregnant-puerperal period					
During pregnancy, delivery or abortion	47 (44.8)	42 (40.0)	10 (9.5)	6 (5.7)	105 (44.3)
During the puerperium	60 (46.5)	34 (26.4)	17 (13.2)	18 (14.0)	129 (54.4)
During the puerperium, from 43 days to less than 1 year	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1 (42.2)
Not informed	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)

Legend: MM = maternal death; NI = not informed.

Note: * variables whose data were not reported were excluded from the analysis.

Source: The authors.

Among the types of cause, the direct causes stood out with a ratio of just over 2:1 presented in Table 2 and with a characterization similar to the general picture.

Table 2 – Characterization of maternal mortality by type of cause, 2011-2019. Brazil, 2023

Variables	Direct cause (n=158)	Indirect Cause (n=74)	Total (n=232)
Age group (years)	**n (%)**	**n (%)**	**n (%)**
10 to 14	5 (100.0)	0 (0.0)	5 (2.1)
15 to19	17 (60.7)	11 (39.3)	28 (12.0)
20 to 29	66 (64.7)	36 (35.3)	102 (44.0)
30 to 39	62 (73.8)	22 (26.2)	84 (36.2)
40 to 49	8 (61.5)	5 (38.5)	13 (5.6)
Education (years)			
None	7 (87.5)	1 (12.5)	8 (3.4)
1 to 7 years	53 (36.3)	28 (19.2)	146 (34.1)
8 to 11 years	71 (65.1)	38 (34.9)	109 (47.0)
12 years and more	17 (70.8)	7 (29.2)	24 (10.3)
Not informed	10 (83.3)	2 (16.7)	12 (5.2)
Color/race			
White	46 (67.6)	22 (32.4)	68 (29.3)
Black/brown	94 (68.6)	43 (31.4)	137 (59.1)
Indigenous	18 (69.2)	8 (30.8)	26 (11.2)
Not Informed	0 (0.0)	1 (100)	1 (0.4)
Marital Status			
Single/separated	94 (68.8)	44 (31.9)	138 (59.5)
Married	46 (73.0)	17 (27.0)	63 (27.2)
Not informed	20 (59.4)	13 (40.6)	32 (13.8)
Occurrence location			
Hospital	143 (67.5)	69 (32.5)	212 (91.4)
Health Establishment	2 (100.0)	0 (0.0)	2 (0.9)
Dwelling-place	7 (70.0)	3 (30.0)	10 (4.3)
Public road	4 (80.0)	1 (20.0)	5 (2.2)
Not Informed	2 (66.7)	1 (33.3)	3 (1.3)
Pregnant-puerperal period			
During pregnancy, delivery or abortion	68 (67.3)	33 (32.7)	101 (43.5)
During the puerperium, up to 42 days	88 (68.8)	40 (31.3)	128 (55.2)
During the puerperium, from 43 days to less than 1 year	1 (100.0)	0 (0.0)	1 (0.4)
Not informed	1 (50.0)	1 (50.0)	2 (0.9)

Note: * variables whose data were not reported were excluded from the analysis.

Source: The authors.

Table 3 describes the characterization of maternal deaths according to the variables and the pregnancy and puerperal period. The prevalence of the data follows the same pattern as the previous tables described.

Table 3 – Characterization of maternal deaths according to the pregnancy-puerperal period, 2011-2019. Brazil, 2023

Variables	During pregnancy, delivery or abortion (n=105)	During the puerperium, up to 42 days (n=129)	Total (n=234)
Age group (years)	**n (%)**	**n (%)**	**n (%)**
10 to 14 years	2 (40.0)	3 (60.0)	5 (2.1)
15 to 19 years	14 (46.7)	16 (53.3)	30 (12.8)
20–29 years	46 (45.5)	55 (54.5)	101 (43.2)
30 to 39 years	38 (44.7)	47 (55.3)	85 (36.3)
40 to 49 years	5 (38.5)	8 (61.5)	13 (5.6)
Education (years)			
None	4 (44.4)	5 (55.6)	9 (3.8)
1 to 7 years	33 (41.8)	46 (58.2)	79 (33.8)
8 to 11 years	46 (41.8)	64 (58.2)	110 (47.0)
12 years and more	13 (54.2)	11 (45.8)	24 (10.3)
Not Informed	9 (75.0)	3 (25.0)	12 (5.1)
Color/race			
White	34 (48.6)	36 (51.4)	70 (29.9)
Black/brown	56 (40.6)	82 (59.4)	138 (59.0)
Indigenous	15 (57.7)	11 (42.3)	26 (11.1)
Marital Status			
Single/separated	57 (43.5)	74 (56.5)	131 (56.0)
Married	34 (49.3)	35 (50.7)	69 (29.5)
NI*	14 (41.2)	20 (58.8)	34 (14.5)
Occurrence location			
Hospital	90 (42.5)	122 (57.5)	212 (90.6)
Other health Establishment	1 (50.0)	1 (50.0)	2 (0.9)
Dwelling place	8 (66.7)	4 (33.3)	12 (5.1)
Public road	4 (80.0)	1 (20.0)	5 (2.1)
Not informed	2 (66.7)	1 (33.3)	3 (1.3)

Legend: MM = maternal mortality; NI = not informed.
Note: * variables whose data were not reported were excluded from the analysis.
Source: The authors.

DISCUSSION

Evaluating the MM index is to show an indicator that reflects the quality of the level of care and the efficiency of public health policies that directly affect the results. Since it is preventable in 92% of cases[11], in the study in question, 237 deaths were found, calculating 92% of this total, it was found that 218.04 deaths could be avoided with adequate quality prenatal care, with the pregnant woman able to recognize severe symptoms, seek and find specialized care.

It is considered ideal for quality care to carry out prenatal care as soon as possible up to 12 weeks in primary health care, with at least six consultations, one in the first quarter, two in the second and three in the third quarter of pregnancy, ideal for quality care [13].

The reduction of maternal mortality (MM) was considered important enough to be included as one of the goals of the Millennium Development Goals (MDGs), which were in effect until 2015. Although the goal of complete eradication was not fully achieved, it is estimated that 1.5 million maternal deaths were prevented between 2000 and 2015. As a continuation of this initiative, the Sustainable Development Goals (SDGs), implemented from 2016 with a target horizon extending to 2030, have carried forward global efforts in this area[14].

Through Ordinance number 1,459 of 2011, the Stork Network planned by the Ministry of Health was implemented to execute a comprehensive care network for women with attention to reproductive planning, pregnancy and prenatal care, delivery and birth, puerperium and comprehensive care for the health of the children. It aims to reduce maternal and child mortality with emphasis on the neonatal component[15].

In the studied period, 60.6 maternal deaths per 100,000 LB were found, being considered high by the CMM. The rate fluctuated throughout the evaluated period, however, it can be observed that the macro-region of Campo Grande in 2017 presented the lowest value of 25/100,000LB in relation to Corumbá in 2011, which presented the highest rate of 248/100,000LB. International parameters inform that MMR is considered low with values below 20 deaths per 100,000 LB, mean from 20 to 49, high from 50 to 149 and very high above 150[16].

In 2017, mortality in the Midwest was 52.0 and in the national context of 58.7[17]. In Mato Grosso do Sul in 2016 it was 80.13 and in 2017 64.84[5]. Compared to our study, although the rate is still considered high, in 2019, the reach of 50.35 in the MMR is an advance in the pursuit of achieving the SDG.

The reduction of MMR in this scenario can be achieved with: prevention of deaths from direct causes; evaluation and qualification of prenatal care; expansion of prenatal monitoring between 20 and 39 years; reduction of gestational risk associated with late pregnancy; and improvement in the quality of information on maternal deaths [7].

The risk of maternal deaths is higher among women with advanced age and less education. This study highlights the age group of 20 to 29 years and 30 to 39 years. Compared to another study, the data remain the same in the regional and national context[17], since in this period there is a greater possibility of the existence of obstetric complications, such as hemorrhage, premature birth and fetal malformation[18,19].

A study with data from 2010-2015 in the state found similar color/race data, in which the highest number of deaths happened in brown women, with a difference that MMR was higher in black and indigenous women, respectively[6]. The issue of discrimination among non-white women, the low quality of health care and the difficulty of access to health services should also be emphasized[13].

The predominant level of education was 8 to 11 years. However, this issue has not become a protective factor for MM, since studies show that low education can favor the development of a high-risk pregnancy and MM, due to difficulty in learning, access to information, disease prevention and health promotion, formulation of concepts and principles related to self-care, aspects that directly reflect on adherence to prenatal care[19,20].

Deaths due to direct causes, during the puerperium and in hospitals are predominant in this study. A similar result that confirms the continuity of this situation in the state was identified[6]. Indirect causes are more present in the national context[19]. Direct causes are due to complications during pregnancy, delivery or the puerperium, and tend to be preventable, which can be achieved with greater qualification of the care provided[6].

This study has as limitations its descriptive nature which limits the level of evidence; however it is necessary due to the need to achieve the SDGs. Another limitation is the use of secondary data that is susceptible to underreporting. We highlight as potentiality the similarity of the findings with the Midwest region and, in some variables, with national findings.

CONCLUSION

Despite the creation of goals to reduce MM, among the health macro-regions studied, we noticed the high rate of maternal deaths. MM cases continue to occur in a large proportion in the state, compared to the goals established at national and international levels. The highest cases occur in black/brown women, aged 20 to 29 years, single, with medium education, in the hospital, during the puerperium due to direct causes and MMR is high.

This evaluation was necessary to show the reflection of the indicator on the quality of the level of care provided and the efficiency of public health policies. Most deaths that occur during pregnancy, delivery and puerperium can be prevented through integrated actions and comprehensive coverage of this population, through simple technologies, with procedures at the primary level of health care, especially prenatal care, enabling the determination of gestational risk and identification of possible complications in the pregnancy-puerperal cycle, facilitating the referral, when necessary, to other levels of care, translating as a primary factor for the reduction of maternal mortality.

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Submitted: March 20, 2023
Accepted: January 29, 2024
Published: July 10, 2024

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All the authors have approved the final version of the text.

Conflict of interest: No conflict of interest.

Financing: Does not have financing

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Editor: Christiane de Fátima Colet. PhD

Editor-in-chief: Adriane Cristina Bernat Kolankiewicz. PhD