

ORIGINAL ARTICLE

Analysis of the perinatal mortality rate in the metropolitan region of grande Vitória, Espírito Santo, Brazil, between 2008 and 2017

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Abstract

Introduction: perinatal mortality is characterized by fetal deaths that occur after the 22nd week of management and neonatal deaths that precede six full days of life. This indicator has been a matter of concern and discussion on the part of entities and organizations involved in comprehensive health care for women and children.

Objective: to characterize perinatal deaths in the Metropolitan Region of Greater Vitória (RMGV) in Espírito Santo and identify associated maternal factors in the period between 2008 and 2017.

Methods: ecological and descriptive study with a quantitative approach, carried out in 2019 on perinatal mortality from 2008 to 2017 at RMGV. Data collection was performed by extracting data from the SIM, SINASC, IBGE databases of the Espírito Santo State Health Department, about perinatal deaths and associated maternal factors. The research respects the ethical precepts of resolution 466/12 of the National Health Council.

Results: the distribution of deaths did not occur homogeneously in the municipalities in the RMGV. The municipality of Vitória had the lowest perinatal mortality rates during the study period, on the other hand, in the comparative analysis between the different municipalities that make up the RMGV, the municipality of Fundão presents the worst scenario regarding perinatal mortality over the years. Regarding the underlying causes of death, it is noted that in this study, the three causes with the highest number of occurrences are complications of the placenta, umbilical cord and maternal affections, not necessarily related to the current pregnancy and intrauterine hypoxia.

Conclusion: there were no significant changes in mortality rates in the Metropolitan Region of Greater Vitória. However, the main deaths occurred in neighborhoods with greater socioeconomic inequalities. Maternal causes were highly representative of deaths, raising issues associated with the improvement of public health policies.

Keywords: perinatal mortality, risk factors, public health.

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Authors summary

Why was this study done?

This study was carried out to characterize perinatal deaths in the Metropolitan Region of Greater Vitória (RMGV) in Espírito Santo and to identify associated maternal factors, in the period between 2008 and 2017.

What did the researchers do and find?

In our study (ecological study) with a quantitative approach, we investigated perinatal mortality between the years 2008 to 2017 in the RMGV. Data collection was carried out by extracting data from the SIM, SINASC, IBGE databases of the Health Department of the State of Espírito Santo, regarding perinatal deaths and associated maternal factors.

What do these findings mean?

Considering the perinatal mortality rates in the Metropolitan Region of Greater Vitória, the municipality of Vitória recorded the lowest perinatal mortality rates, on the other hand, the municipality of Fundão showed the worst scenario in relation to this index in the research period. Thus, it was found that most deaths occurred in neighborhoods with greater socioeconomic inequalities.

Highlights

Irregular mortality distribution rate between the years 2008-2017;
There were no significant changes in the mortality of the municipalities surveyed;
The municipality of Vitória has less variability in mortality;
Among the analyzed neighborhoods, deaths are concentrated in low economic classes.

INTRODUCTION

Perinatal mortality has been a matter of concern and discussion on the part of entities and organizations involved in comprehensive child health care. This was included in the Millennium Development Goals (MDG), a commitment assumed by member countries of the United Nations (UN), to which Brazil is a signatory, since infant mortality reflects the living conditions of society¹, and the Sustainable Development Goals (SDG 3), which calls on member countries to end under-5 mortality by 2030².

Historically, it is possible to highlight initiatives that positively impacted care for pregnant women and newborns, such as: the alignment of public policies, the organization of services, the systematization of care proposed by the Brazilian Ministry of Health, through initiatives such as Rede Cegonha (Stork Network) and the regulations introduced by the Diretrizes Nacionais de Assistência ao Parto Normal (National Guidelines for Assistance to Normal Childbirth), as well as the document proposed by the Sociedade Brasileira de Pediatria para o Nascimento Seguro (Brazilian Society of Pediatrics for Safe Birth). These initiatives have brought irrefutable benefits in reducing perinatal mortality. However, it is necessary to advance in confronting these issues, based on comprehensive care and the implementation of a prevention paradigm^{3,4}.

The perinatal period was initially defined by the World Health Organization (WHO) in the eighth revision of the International Classification of Diseases (ICD-8) in 1967, as that between the 28th week of gestation or children weighing over 1,000 g to the seventh day of life. With the ICD-10, edited in 1993 and adopted in Brazil in 1996, this period begins in the 22nd week of pregnancy and considers children weighing over 500g⁵.

According to the Brazilian Ministry of Health, the perinatal mortality rate is the number of deaths occurring in the perinatal period per thousand total births, in the population residing in a given geographic area, in the year considered⁶.

It is estimated that there are 4.9 million perinatal deaths per year in the world, 2 million of which are fetal and 2.9 million are early neonatal. In Brazil, between 2001

and 2015, the perinatal mortality rate changed from 22.3 to 17.4 per thousand births, with the southern region having the lowest rate and the northeast the highest, with values of 15.4 and 21.2, respectively⁶⁻⁸.

Several authors point out risk factors associated with perinatal mortality, evidencing avoidable causes closely related to the quality of care, ranging from situations arising from the quality of prenatal care, delivery and newborn care⁶⁻¹⁰.

With the identification of risk factors for perinatal mortality, it becomes tangible to reflect on the quality of care provided to pregnant women and their fetus. Thus, enabling the planning of actions to confront and propose public health policies that impact on the reduction of maternal and child mortality indicators¹¹.

In this context, considering the relevance of the topic, this study aims to analyze the perinatal mortality rate in the metropolitan region of Vitória, Espírito Santo, and to identify factors associated with deaths in the period between 2008 and 2017.

METHODS

This is an ecological study with a quantitative approach. The study site was the Metropolitan Region of Greater Vitória in the State of Espírito Santo, Brazil, which covers the municipalities of Cariacica, Fundão, Guarapari, Serra, Viana, Vila Velha and Vitória.

The study population consisted of perinatal deaths (fetal and early neonatal) in the cities of the Metropolitan Region of Greater Vitória, Espírito Santo, Brazil, and the total number of live births in this period. The concept of perinatal mortality rate was defined in accordance with the Brazilian Ministry of Health¹², which considered the number of fetal deaths from 22 complete weeks of gestation (154 days) plus deaths occurring up to the seventh day of life, per thousand total births (fetal deaths plus live births), in period, in the considered geographic space.

For this study, perinatal mortality was considered as a dependent variable. The independent variables consist of the types of deaths (fetal/non-fetal), year of occurrence, municipality of residence, underlying cause of death, sex,

place of death (home, hospital, other health facilities, public road), education of mother, type of pregnancy, type of delivery and birth weight.

Data were extracted through the Sistema de Informação sobre Mortalidade (Mortality Information System/SIM) and Sistema de Informações sobre Nascidos Vivos (Information System on Live Births/SINASC) of the Espírito Santo State Health Department to prevent underreported results and inconsistency regarding the updating of data in these systems.

In the statistical analysis to assess the trend of perinatal mortality, regression models were used, with the mortality rate (dependent variable - Y) and time (independent variable - X) expressed in the years that make up the period as the dependent variable in the study period (2008 to 2017). The trend was also estimated with national standardized rates for each location and age group, with a confidence level of 95% and the statistical program used was the Data Analysis and Statistical Software for Professionals (Stata) version 16.0®.

The study was approved on June 26, 2018, by the Research Ethics Committee of the Escola Superior de Ciências da Santa Casa de Misericórdia de Vitória – CAAE

89718218.6.0000.5065, under opinion number 2.738.639, and complies with the prerogatives of the resolution 466/12 of the National Health Council (CNS) regarding research with human beings.

RESULTS

The total number of live births between the years 2008 to 2017 was 273,611 in the Metropolitan Region of Greater Vitória (RMGV). Deaths in this same period were equivalent to 4,003.

According to figure 1, it is possible to verify the perinatal mortality rates in the RMGV between the years 2008 to 2017. There is an irregular distribution along them, highlighting the higher number of cases per thousand live births in the years of 2011 (16.11) and 2015 (15.38), contrasting a decline in the number of cases in the years 2010 (14.00), 2014 (13.99) and 2017 (13.90).

Regarding the comparison of municipalities in the years 2008 to 2017, it is observed that there were no significant changes in the mortality rate between the municipalities according to the p value found in the statistical analysis of logistic regression, as shown in table 1.

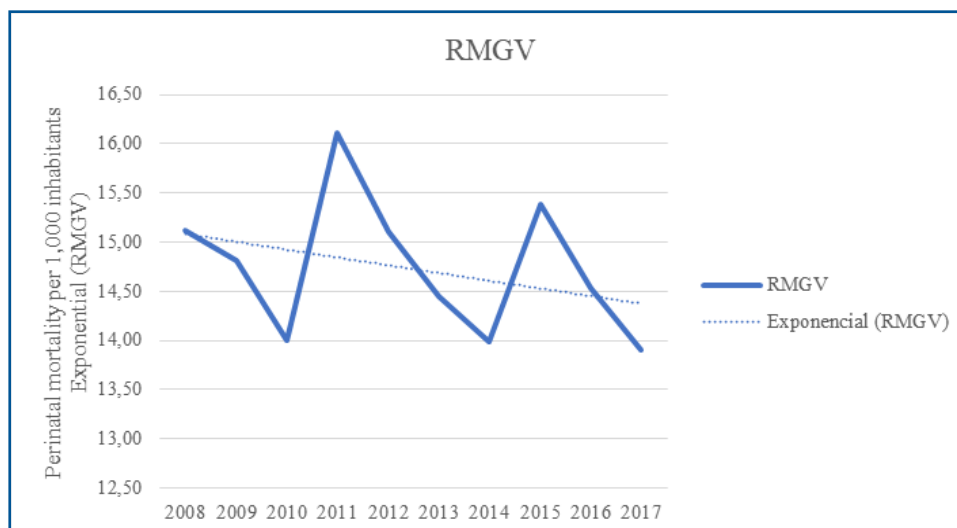


Figure 1: Perinatal mortality between the years 2008 to 2017 in the Metropolitan Region of Greater Vitória

Table 1. Perinatal mortality rate and logistic regression between the years 2008 to 2017 in the municipalities of the RMGV. Vitória, Espírito Santo, 2021

Location	Perinatal mortality rate	B	IC	P
Cariacica	16.45	-0.05	-0.04/0.28	0.703
Fundão	19.60	0.12	-2.62/2.87	0.920
Guarapari	17.82	-0.47	-1.29/0.33	0.214
Serra	14.90	0.00	-0.38/0.39	0.976
Viana	16.86	0.31	-0.28/0.92	0.258
Vila Velha	13.62	-0.14	-0.45/0.15	0.293
Vitória	11.50	-0.01	-0.43/0.39	0.933
Espírito Santo	15.81	-0.06	-0.18/0.06	0.310

*perinatal mortality rate per 1000 births.

The municipality of Vitória has the lowest mortality rate variability in relation to the others and has the best performance in the analysis, reaching an average of 9.12 deaths per 1000 live births in 2014. However, the municipality of Fundão stands out, with a mortality rate of 31.25 and 38.79 per 1000 live births, in the years 2008 and 2016, respectively, which shows an ascendancy in the graphic line. From 2009 to 2010, also in the municipality of Fundão, there was a marked reduction in the perinatal mortality coefficient, from 16.81:1000 to 3.60:1000.

As for the other municipalities, the trend was maintained in the longitudinal distribution, with emphasis on the municipality of Guarapari, which showed an increase in the number of deaths between the years 2010 to 2013.

It is observed that among the neighborhoods of the analyzed municipalities, deaths are concentrated in low economic class neighborhoods with greater inequality or more populous neighborhoods. Except for the municipalities of Guarapari and Vitória, all had more deaths in neighborhoods with greater inequalities (table 2).

Table 2: Neighborhoods with the highest number of deaths in the cities that make up RMGV between the years 2008 to 2017

Municipalities and neighborhoods	n	%
Cariacica		
Nova Rosa Da Penha	41	4.1
Flexal	39	3.9
Fundão		
Praia Grande	10	20.8
Timbuí	7	14.6
Guarapari		
Praia Do Morro	18	6.3
São Gabriel	18	6.3
Serra		
Jacaraípe	58	5.1
Nova Carapina	52	4.6
Viana		
Marcílio De Noronha	33	18.5
Nova Bethânia	26	14.6
Vila Velha		
Barramares	35	4.1
Praia Da Costa	31	3.6
Vitória		
Jardim Camburi	44	8.4
São Pedro	42	8

Among the characterization of deaths, it is observed that most mothers had between 8 and 11 years of education (39.9%), the most common birth was vaginal (53.59%) and they had an average age of 26.9 years, having approximately an average of 1.8 living children. As for the characteristics of the fetus, fetal deaths (63.14%) stand out from non-fetal deaths (36.86%), in which 54.19% were male and of those identified by race, 24.59% were brown, as shown in the table below.

Table 3. Characteristics of perinatal deaths in the RMGV between the years 2008 to 2017

Variables	n	%
Mother's Education		
No education	58	1.45
1 to 3 years	240	5.99
4 to 7 years	841	20.97
8 to 11 years	1600	39.90
12 years or more	814	20.30
Ignored	457	11.40
Type of pregnancy		
Unique	3570	89.03
Double	283	7.06
Triple or more	16	0.40
Ignored	141	3.52
Birth type		
Cesarean	1685	42.02
Vaginal	2149	53.59
Ignored	176	4.39
Mother's age		
Media (DP)	26.9 (7.1)	
Median	26.0	
Maximum	47.0	
Minimum	12.0	
Number of living children		
Media (DP)	1.8 (1.5)	
Median	1.0	
Maximum	11.0	
Minimum	0.0	
Type of death		
Not fetal	1478	36.86
Fetal	2532	63.14
Fetus sex		
Female	1795	44.76
Male	2173	54.19
Ignored	42	1.05
Fetus race		
Yellow	3	0.07
White	509	12.69
Indigenous	2	0.05
Not identified	2349	58.58
Mixed	986	24.59
Black	39	0.97
Ignored	122	3.04

With regard to the underlying causes of perinatal deaths in the RMGV, it was identified that the Fetus and Newborn Affected by Complications of the Placenta, Umbilical Cord and Membranes was the most incident, with 25.99% of total deaths, followed by Fetus and Newborn

Affected by Maternal Disorders, Not Mandatory Related to Current Pregnancy, with 25.14% and intrauterine hypoxia with 8.60%. Regarding the causes of less frequent deaths, there are congenital malformations, aggression by sharp or penetrating and blunt objects, among others (table 4).

Table 4: Basic causes of perinatal deaths in the RMGV between the years 2008 to 2017

Basic causes	N	%
Fetus and Newborn Affected by Placenta, Umbilical Cord, and Membrane Complications	1042	25.99
Fetus and Newborn Affected by Maternal Disorders Not Necessarily Related to Current Pregnancy	1008	25.14
Intrauterine Hypoxia	345	8.6
Fetus and Newborn Affected by Maternal Pregnancy Complications	338	8.43
Other Congenital Malformations Not Elsewhere Classified	138	3.44
Anencephaly and Similar Malformations	96	2.39
Fetal Death of Unspecified Cause	82	2.04
Discomfort (anxiety) of the Newborn's Respiratory	77	1.92
Fetus and Newborn Affected by Other Complications of Labor and Childbirth	71	1.77
Congenital Lung Malformations	63	1.57
Asphyxia at birth	56	1.4
Transient Disorders of Specific Carbohydrate Metabolism in the Fetus and Newborn	56	1.4
Neonatal Aspiration Syndrome	55	1.37
Newborn Bacterial Septicemia	46	1.15
Other Congenital Heart Malformations	38	0.95
Congenital Malformations of the Musculoskeletal System Not Elsewhere Classified	38	0.95
Congenital syphilis	37	0.92
Disorders Related to Short-Term Pregnancy and Low Birth Weight Not Elsewhere Classified	34	0.85
Congenital Cardiac Septal Malformations	34	0.85
Fetus and Newborn Affected by Harmful Influences Transmitted to the Fetus Via Placenta or Breast Milk	30	0.75
Cardiovascular Disorders Originating in the Perinatal Period	20	0.5
Other Ailments Originating in the Perinatal Period	20	0.5
Edwards Syndrome and Patau Syndrome	20	0.5
Other Conditions Compromising the Integument Specific to the Fetus and Newborn	19	0.47
Other Respiratory Disorders Originating in the Perinatal Period	17	0.42
Congenital Malformations of the Chambers and Cardiac Communications	17	0.42
Renal Agenesis and Other Kidney Reduction Defects	16	0.4
Congenital Pneumonia	12	0.3
Hemolytic Disease of the Fetus and Newborn	12	0.3
Delayed Fetal Growth and Fetal Malnutrition	11	0.27
Other Congenital Brain Malformations	11	0.27
Congenital Malformations of the Great Arteries	11	0.27
Necrotizing Enterocolitis of the Fetus and Newborn	10	0.25
Kidney Cystic Diseases	10	0.25
Congenital Malformations of the Aortic and Mitral Valve	9	0.22
Pulmonary Hemorrhage Originating in the Perinatal Period	8	0.2
Congenital Viral Diseases	6	0.15
Microcephaly	5	0.12
Congenital Malformations Of The Pulmonary and Tricuspid Valve	5	0.12
Other causes cited only 4 times	24	0.1

Continuation - Table 4: Basic causes of perinatal deaths in the RMGV between the years 2008 to 2017

Basic causes	N	%
Other causes cited only 3 times	18	0.42
Other causes cited only twice	22	0.55
Other causes cited only 1 time	21	0.42

DISCUSSION

The distribution of deaths was not homogeneous in the municipalities in the RMGV. Even so, the perinatal mortality rate did not show a significant change between the years 2008 to 2017 in the Metropolitan Region of Greater Vitória. However, it is noted that the rates are lower when compared to the Brazilian reality in 2010, when it reached 21.05/1000 births, and above developed countries, which reached an average of 2 to 7:1000 births. The US fetal mortality rate was 5.96 in 2013 and 6.05 in 2012¹³.

The municipality of Vitória had the lowest perinatal mortality rates during the study period. The city is the capital of the State of Espírito Santo, and it is home to hospitals and health services with the highest levels of complexity. According to the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics) (2010), the municipality's human development index was 0.845 and considered the fourth best in the country, which may explain the better result associated with the perinatal mortality rate¹⁴. Furthermore, in Vitória, the registration of prenatal care is carried out through the Prenatal Clinical File and inserted within the Well-Being Network, which is a computerized system of the health care network of the Municipal Health Department. of the municipality. A survey conducted in the state of Santa Catarina on perinatal mortality, in the southern region of the country, describes those good coefficients may be associated with greater access to and structuring of health services and favorable social conditions, such as less inequality, work, income and education when comparing the reality in the national territory¹⁵.

Although Fundação is in the RMGV, according to Almeida and Szwarcwald¹⁶, health services in Brazil are concentrated in urban areas, capitals, and central areas, to the detriment of rural areas, less favored and peripheral areas. There is, together with socioeconomic and cultural factors, great inequality in the supply and greater difficulty in accessing health services, due to the concentration of establishments with obstetric beds in large cities.

Furthermore, in agreement with the finding, a survey carried out in the city of Rotterdam, Netherlands, identified that children of women who lived in less favored neighborhoods were 1.8 more likely to die, compared to children of women who lived in more economically favored neighborhoods. This increase was related to socioeconomic factors, demographics, lifestyle, and the quality of obstetric care offered¹⁷.

Regarding the underlying causes of death, it is noted that in this study, the three causes with the highest number of occurrences are complications of the placenta, umbilical cord and limbs and maternal affections, not necessarily related to the current pregnancy, and intrauterine hypoxia.

Most were maternal causes, with a significant

number, totaling 68.16% of deaths, and most cases are feasible situations to be addressed with access to health services, quality prenatal care and safe birth, demanding public health policies possible to be implemented. Of these, it was identified that perinatal outcomes due to maternal causes, hemorrhages (especially placental abruption) and hypertensive diseases (especially pre-eclampsia) are the most likely to have death as an outcome, especially third trimester fetal ones¹⁸.

Other studies showed results similar to these, with 22.71% of fetal deaths having intrauterine hypoxia as the registered cause and 20.8% as death without explanation¹⁹. Jacinto *et al.*²⁰ found intrauterine hypoxia as the cause of fetal death in 44.7% of cases.

Linking to the underlying causes of perinatal deaths in the study, placental complications, vaginal bleeding caused by placental abruption or placenta previa is associated with a very high risk of preterm delivery. In addition, other common reasons for indicated premature births include pre-eclampsia or eclampsia and intrauterine growth restriction. Births following spontaneous preterm labor are considered a syndrome resulting from multiple causes, including infection or inflammation, vascular disease, and over-distension. Premature birth remains one of the leading causes of perinatal morbidity and mortality worldwide²¹.

The causes of perinatal mortality due to prematurity are potentially preventable and need to have their determinants identified in order to propose efficient measures for their prevention. To better understand the changes in the causes of premature birth, it is necessary to address the quality of prenatal care and delivery²².

In this context, the relevant role played by fetal death investigation committees is highlighted, which are increasingly acting in Brazil. A survey carried out at the Regional Health Unit of Belo Horizonte, Minas Gerais, Brazil, pointed out that the implementation and performance of the committees occurred differently in the different municipalities that comprise it, noting that those municipalities that had their implementation earlier had better indicators. This fact supports the prerogative that the implementation of public health policies and organization of services are essential to improve the morbidity and mortality conditions of populations²³.

Considering causes related to newborns, Congenital Malformations Not Classified Elsewhere, showed an important representation, being these of different etiologies, cardiac, renal, central nervous system, pulmonary and others, consequent or not of genetic alterations, which represented Another important cause of death, it is noteworthy that deaths related to fetal causes are difficult to approach and require, in most cases, specialized treatment and a tertiary health care network. In a spatial

aggregation study carried out in Salvador by Nascimento *et al.*²⁴, the authors identified that congenital anomalies and ill-defined causes were responsible for 6.3% and 1.5% of the causes of perinatal death, respectively.

Regarding the low rates of congenital malformations, deformities and chromosomal anomalies compared to other causes of perinatal death, it should be considered that the study is carried out in an emerging country. In developed countries, these conditions have a proportionally higher value of perinatal deaths, due to the low percentage of deaths from preventable causes²⁵.

It is also worth mentioning that the percentage of unspecified and ill-defined fetal deaths is still frequent, also, in other studies. This group can infer that there is difficulty in accessing or precarious health care. However, if the number of deaths classified as ill-defined increases, the quality of the study data may be compromised. However, these causes tend to decrease, as health policies focused on the investigation of infant deaths have been implemented throughout the country²⁶.

Thus, it is important to assess all deaths in order to find the cause and adopt preventive measures. Thus, it is clear that the methods of evaluating deaths have positive and negative aspects, but the analysis of each one is essential for investigating deaths and for evaluating the quality of health services provided in the region²⁶.

In view of the results obtained, it is worth emphasizing the relationship between the proportion of neonatal deaths in the first hours of life and that of fetal deaths with the quality of care offered in the pregnancy-puerperal cycle of women. Therefore, to reduce infant and perinatal mortality, greater efforts are needed so that health actions reflect improved access and quality of care²⁷.

Comprehensive care for patients is essential and corresponds to humanized care that is directly associated with health promotion and disease prevention. Aspects such as equity, development, partnerships, participation, bonding, as well as effective public policy strategies contribute to the reorientation of public health service practices, accountability of all involved and finding solutions for complications²⁸.

Thus, to achieve the millennium goals, it is necessary to expand child health interventions in several places. One way to support the process is to increase the monitoring of deaths and promote correct registration. In addition, it is necessary to know the underlying causes and strengthen information systems, so that in the near future, estimates of infant mortality in the country can be improved²⁹.

A limitation found in the study was the possible occurrence of underreporting of births and deaths or the existence of blank and ignored variables. There may also be errors and difficulties in filling in the variables, such as the newborn's race/color that is reported by the mother or observed by the professional who collects the data, or situations of birth weight and Apgar score, incompatible with the week of pregnancy.

The Brazilian Ministry of Health establishes the mandatory surveillance of infant and fetal deaths in services that make up the Sistema Único de Saúde (Unified Health

System/SUS), in accordance with Ordinance No. 72 of the Ministry of Health, of January 11, 2010. All notifications must have their fields filled in with the information from the Death Certificate, to assist in the investigation of cases³⁰.

Still, there are problems with perinatal mortality records, although most of these deaths occur in hospital units. There is, underreporting and lack of relevant information to obtain specific indicators, such as the percentage of intrapartum deaths. In the vast majority of federation units, it is not yet possible to directly calculate perinatal mortality rates by the Sistema de Informação de Mortalidade (Mortality Information System/SIM)³¹.

There were no significant changes in mortality rates in the Metropolitan Region of Greater Vitória. The municipality of Fundão had the highest rate compared to other municipalities and had an increase in the years 2008 and 2016, and this is also the municipality in the analyzed region that is located more peripherally to the state capital, Vitória, also having the least number of services of health.

The three causes with the highest number of deaths were complications of the placenta, umbilical cord and membranes and maternal affections, not necessarily related to the current pregnancy and intrauterine hypoxia.

CONCLUSION

There were no changes in mortality rates in the Metropolitan Region of Greater Vitória. The municipality of Fundão had the highest rate detected compared to the other municipalities and had an increase in the years 2008 and 2016, and this is also the municipality in the region that is located more peripherally to the state capital, Vitória, also having the lowest amount of health care services. The three causes with the highest number of deaths were complication of the placenta, umbilical cord and membranes and maternal condition not necessarily related to the current pregnancy and intrauterine hypoxia.

Author Contributions

All authors contributed to the manuscript. Larissa Zuqui Ribeiro: Participated in data collection, data analysis, statistical analysis and writing of the text; Cristina Ribeiro Macedo: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text; Mariana Rabello Laignier: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text; Bárbara Barbosa dos Santos: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text; Luiz Vinicius de Alcantara Sousa: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text; Luiz Carlos de Abreu: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text; Italla Maria Pinheiro Bezerra: Participated in the general orientation of the research, definition of the study design, statistical analysis, discussion of results and final version of the text.

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Statements of ethical approval

The study was approved on June 26, 2018, by the Comitê de Ética em Pesquisa da Escola Superior de Ciências da Santa Casa de Misericórdia de Vitória (Research Ethics Committee of the Santa Casa de Misericórdia School of Science in Vitória) – CAAE 89718218.6.0000.5065, under opinion number 2,738,639.

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Competing interests

Not applicable.

REFERENCES

1. Brasil. Objetivos de desenvolvimento do milênio: relatório nacional de acompanhamento. Ministério Da Econ Inst Pesqui Econômica Apl Secr Planej e Investimentos Estratégicos 2014.
2. Brasil. Agenda 2030 para o Desenvolvimento Sustentável. Ministério Das Relações Exteriores 2017.
3. Brasil. PORTARIA No 1.459, DE 24 DE JUNHO DE 2011, Institui, no âmbito do Sistema Único de Saúde - SUS - a Rede Cegonha. Ministério Da Saúde 2011.
4. SBP. Documento Científico. Departamento Científico. Nascimento Seguro. no 3, abril de 2018. Soc Bras Pediatr 2018.
5. Brasil. A Mortalidade Perinatal e Neonatal no Brasil. Ministério Da Saúde 1998.
6. Brasil. Saúde Brasil 2019 uma análise da situação de saúde com enfoque nas doenças imunopreveníveis e na imunização. Ministério Da Saúde Secr Vigilância Em Saúde Dep Análise Em Saúde e Vigilância Doenças Não Transm 2019: 520.
7. Lansky S, França E, Leal M do C. Mortalidade perinatal e evitabilidade: revisão da literatura. Rev Saude Publica 2002; 36: 759–72.
8. Migoto MT, de Oliveira RP, de Andrade L, de Souza Freire MH. Correlação espacial da mortalidade perinatal com condições sociais, econômicas e demográficas: estudo ecológico. Rev Saúde Pública Do Paraná 2020, 3.
9. Ezeh OK, Uche-Nwachi EO, Abada UD, Agho KE. Community-and proximate-level factors associated with perinatal mortality in Nigeria: evidence from a nationwide household survey. BMC Public Health 2019; 19:1–9.
10. Ebenezer ED, Londhe V, Rathore S, Benjamin S, Ross B, Jeyaseelan L, et al. Peripartum interventions resulting in reduced perinatal mortality rates, and birth asphyxia rates, over 18 years in a tertiary centre in South India: a retrospective study. BJOG An Int J Obstet Gynaecol 2019; 126:21–6.
11. Demitto M de O, Gravena AAF, Dell’Agnolo CM, Antunes MB, Pelloso SM. Gestação de alto risco e fatores associados ao óbito neonatal. Rev da Esc Enferm da USP 2017; 51.
12. Brasil. Taxa de Mortalidade Perinatal (coeficiente de mortalidade perinatal) Ficha de qualificação. Ministério Da Saúde 2000.
13. MacDorman MF, Gregory ECW. Fetal and perinatal mortality: United States, 2013 2015.
14. Lorena RB, Bergamaschi RB, LEITE G dos R. Análise exploratória espacial do Índice de Desenvolvimento Humano municipal do estado do Espírito Santo. Anais XV Simpósio Bras Sensoriamento Remoto-SBSR, Curitiba, PR, Bras 2011; 30:4776.
15. Borges DC, João CG, Hoffmann CBPC, Vaichulonis CG, Silveira Filho LC, Silva JC. Fatores de risco associados à mortalidade perinatal: um estudo de caso-controle. Arq Catarinenses Med 2019; 48: 56–66.
16. Almeida WS de, Szwarcwald CL. Mortalidade infantil e acesso geográfico ao parto nos municípios brasileiros. Rev Saude Publica 2012; 46: 68–76.
17. Timmermans S, Bonsel GJ, Steegers-Theunissen RPM, Mackenbach JP, Steyerberg EW, Raat H, et al. Individual accumulation of heterogeneous risks explains perinatal inequalities within deprived neighbourhoods. Eur J Epidemiol 2011; 26: 165–80.
18. Allanson ER, Muller M, Pattinson RC. Causes of perinatal mortality and associated maternal complications in a South African province: challenges in predicting poor outcomes. BMC Pregnancy Childbirth 2015; 15: 1–7.

19. Vieira MSM. Natimortalidade no Brasil e revisão sistemática sobre os sistemas de classificação utilizados para o esclarecimento das causas do óbito fetal 2017.
20. Jacinto E, Aquino EML, Mota ELA. Mortalidade perinatal no município de Salvador, Bahia: evolução de 2000 a 2009. *Rev Saude Publica* 2013; 47: 846–53.
21. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. *Lancet* 2008; 371: 75–84.
22. Silveira MF, Santos IS, Barros AJD, Matijasevich A, Barros FC, Victora CG. Aumento da prematuridade no Brasil: revisão de estudos de base populacional. *Rev Saude Publica* 2008; 42: 957–64.
23. Rodrigues LA, Martins EF, Aguiar RALP, Dutra IR, Pimenta AM. Avaliação dos comitês de prevenção de óbitos maternos, fetais e infantis de uma região do estado de Minas Gerais, Brasil. *Rev Min Enferm* 2020; 24: 1–11.
24. Nascimento RDC de S, Costa MDCN, Braga JU, Natividade MS da. Spatial patterns of preventable perinatal mortality in Salvador, Bahia, Brazil. *Rev Saude Publica* 2017; 51. DOI: 10.11606/s1518-8787.2017051007076
25. McClure EM, Nalubamba-Phiri M, Goldenberg RL. Stillbirth in developing countries. *Int J Gynecol Obstet* 2006; 94: 82–90.
26. Dias BAS, Santos Neto ET dos, Andrade MAC. Classificações de evitabilidade dos óbitos infantis: diferentes métodos, diferentes repercussões? *Cad Saude Publica* 2017; 33: e00125916.
27. Laurenti R, de Siqueira AAF, de Mello Jorge MHP, Gotlieb SLD, Pimentel EC. Mortalidade perinatal em hospitais do estado de São Paulo: aspectos metodológicos e algumas características maternas e do conceito perinatal mortality in hospitals of the state of São Paulo: methodological aspects and some CHARACTERISTICS OF. *J Hum Growth Dev* 2013; 23: 261–9.
28. Bezerra IMP, Sorpreso ICE. Concepts and movements in health promotion to guide educational practices. *J Hum Growth Dev* 2016; 26: 11. DOI:10.7322/jhgd.113709
29. Rodrigues EC, Alves BCA, da Veiga GL, Adami F, Carlesso JS, dos Santos FFW, et al. Mortalidade neonatal em Luanda, Angola: o que pode ser feito para sua redução? *J Hum Growth Dev* 2019; 29: 161–8.
30. Brasil. Portaria GM No 72, de 11 de Janeiro de 2010. Ministério Da Saúde 2010.
31. Martins EF, Lana FCF, Maria E. Tendencia de la mortalidad perinatal en Belo Horizonte, 1984 a 2005. *Rev Bras Enferm* 2010; 63: 446–51.

Resumo

Introdução: a mortalidade perinatal caracteriza-se pelos óbitos fetais que ocorrem a partir da 22^a semana de gestação e os óbitos neonatais que antecedem seis dias completos de vida. Este indicador tem sido motivo de preocupação e discussão por parte de entidades e organizações envolvidas na atenção à saúde integral da mulher e da criança.

Objetivo: caracterizar os óbitos perinatais da Região Metropolitana da Grande Vitória (RMGV) no Espírito Santo e identificar fatores maternos associados, no período entre 2008 e 2017.

Método: estudo ecológico e descritivo de abordagem quantitativa, realizado no ano de 2019 acerca da mortalidade perinatal entre os anos de 2008 a 2017 na RMGV. A coleta de dados foi realizada através extração dos dados das bases SIM, SINASC, IBGE da Secretaria de Saúde do Estado do Espírito Santo, acerca dos óbitos perinatais e fatores maternos associados. A pesquisa respeita os preceitos éticos da resolução 466/12 do Conselho Nacional de Saúde.

Resultados: a distribuição dos óbitos não ocorreu de forma homogênea nos municípios na RMGV. O município de Vitória apresentou os menores índices de mortalidade perinatal durante o período estudado, em contrapartida, na análise comparativa entre os diferentes municípios que compõe a RMGV, o município de Fundão apresenta o pior cenário relativo à mortalidade perinatal ao longo dos anos. Acerca das causas bases de óbitos, nota-se que neste estudo, as três causas com maior número de ocorrência são complicações da placenta, do cordão umbilical e afecções maternas, não obrigatoriamente relacionadas com a gravidez atual e hipóxia intrauterina.

Conclusão: não houve mudanças significativas nas taxas de mortalidade na Região Metropolitana da Grande Vitória. Contudo, os principais óbitos ocorreram em bairros com maiores desigualdades socioeconômicas. As causas maternas representaram uma grande representatividade frente aos óbitos, levantando questões associadas a melhora de políticas públicas de saúde.

Palavras-chave: mortalidade perinatal; fatores de risco; saúde pública.

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