



## Analysis of perinatal deaths in the metropolitan region of Grande Vitória regarding their preventability

### *Análise dos óbitos perinatais na Região Metropolitana da Grande Vitória quanto a sua evitabilidade*

### *Análisis de las muertes perinatales en la Región Metropolitana de la Grande Vitória cuanto a su evitabilidad*

**José Lucas Souza Ramos** 

School of Sciences of the Santa Casa de Misericórdia de Vitória. Vitória - Espírito Santo - Brazil

**Ana Paula de Araújo Machado** 

School of Sciences of the Santa Casa de Misericórdia de Vitória. Vitória - Espírito Santo - Brazil

**Juliana Maria Bello Jastrow** 

School of Sciences of the Santa Casa de Misericórdia de Vitória. Vitória - Espírito Santo - Brazil

**Lais Rodrigues Martins** 

School of Sciences of the Santa Casa de Misericórdia de Vitória. Vitória - Espírito Santo - Brazil

**Larissa Zuqui Ribeiro** 

School of Sciences of the Santa Casa de Misericórdia de Vitória. Vitória - Espírito Santo - Brazil

**Luiz Carlos de Abreu** 

Federal University of Espírito Santo (UFES). Vitória - Espírito Santo - Brazil

**Italla Maria Pinheiro Bezerra** 

School of Sciences of the Santa Casa de Misericórdia de Vitória. Vitória - Espírito Santo - Brazil

#### ABSTRACT

**Objective:** To analyze perinatal deaths in the Greater Vitória Metropolitan Region and classify them in terms of their preventability. **Method:** This is an ecological and descriptive study with a quantitative approach, divided into two phases. Phase I involved the collection of secondary data from 2008 to 2017, using spatial analysis techniques to characterize perinatal mortality. The data were sourced from the Mortality Information System, the Live Births Information System, and the Demographic Census of the Brazilian Institute of Geography and Statistics. Phase II focused on describing the epidemiological profile of perinatal mortality from the perspective of preventability. Data were gathered from the described information systems, along with an assessment of preventability criteria. **Results:** The results show that a large portion of the 4,010 perinatal deaths were due to potentially preventable factors. According to the classification by the São Paulo State Data Analysis System Foundation, 3,717 of the deaths were deemed preventable, with a higher concentration in deaths preventable through proper care during childbirth. In the Preventable Deaths Causes List by Interventions, 3,072 of the perinatal deaths were considered preventable, particularly those that could be reduced through adequate care for women during childbirth. According to the Taucher classification, 3,350 of the perinatal deaths were due to preventable causes. Based on the Reduced Tabulation List of Causes of Infant Mortality, 3,788 of the deaths were classified as preventable. **Conclusion:** Perinatal deaths in the Greater Vitória Metropolitan Region, considering preventability classifications, were predominantly linked to inadequate care for women during childbirth. **Descriptors:** Infant Mortality; Perinatal Loss; Stillbirth; Maternal and Child Care.

#### RESUMO

**Objetivo:** Analisar os óbitos perinatais da Região Metropolitana da Grande Vitória e sua classificação quanto a sua evitabilidade. **Método:** Estudo ecológico e descritivo, com abordagem quantitativa dividido em etapa I, com coleta dos dados secundários de 2008 a 2017 e utilização de técnicas de análise espacial para caracterização da mortalidade perinatal, extraídas do Sistema



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de Informação sobre Mortalidade Sistema de Informação de Nascidos Vivos e Censo Demográfico do Instituto Brasileiro de Geografia e Estatística. Etapa II refere-se à descrição do perfil epidemiológico da mortalidade perinatal sob a perspectiva da evitabilidade. Os dados foram coletados nos sistemas de informação descritos, além da avaliação quanto aos critérios de evitabilidade. **Resultados:** Os resultados revelam que grande parte dos 4.010 óbitos perinatais ocorreram devido a fatores potencialmente evitáveis. Conforme a classificação da Fundação Sistema Estadual de Análise de Dados de São Paulo, 3.717 dos óbitos são evitáveis, com maior concentração em óbitos evitáveis por adequada atenção ao parto. Na classificação da Lista de Causas de Mortes Evitáveis por Intervenções, 3.072 dos óbitos perinatais são considerados evitáveis, com destaque para os óbitos reduzíveis por adequada atenção à mulher no parto. Na classificação de Taucher, o número óbitos perinatais decorrentes de causas evitáveis corresponderam a 3.350. Pela Lista Reduzida de Tabulação de Causas de Mortalidade Infantil, 3.788 dos óbitos tabulados correspondem a tal classificação. **Conclusão:** Os óbitos perinatais da Região Metropolitana da Grande Vitória, considerando as classificações de evitabilidade, apresentaram maior ocorrência em decorrência de uma adequada atenção à mulher no parto.

**Descritores:** Mortalidade Infantil; Perda Perinatal; Natimorto; Assistência Materno-Infantil.

## RESUMEN

**Objetivo:** Analizar las muertes perinatales de la Región Metropolitana de la Grande Vitória y su clasificación cuanto a su evitabilidad. **Método:** Estudio ecológico, descriptivo, con enfoque cuantitativo dividido en etapas I, con recogida de los datos secundarios de 2008 hasta 2017 y utilización de técnicas de análisis espacial para caracterización de la mortalidad perinatal, extraídas del Sistema de Información sobre Mortalidad Sistema de Información de Nascidos Vivos y Encuesta de Población del Instituto Brasileño de Geografía y Estadística. Etapa II se refiere a la descripción del perfil epidemiológico de la mortalidad perinatal bajo la perspectiva de la evitabilidad. Los datos se recogieron en los sistemas de información descritos y se evaluó su evitabilidad. **Resultados:** Gran parte de las 4.010 muertes perinatales ocurrieron debido a factores potencialmente evitables. Según los datos 3.717 de las muertes son evitables, principalmente relacionadas con la atención del parto. En la Lista de Causas de Muertes Evitables por Intervenciones, 3.072 de las muertes perinatales son consideradas evitables, con enfoque para las muertes reducibles por adecuada atención a la mujer en el parto. En la clasificación de Taucher, el número de muertes perinatales decurrentes de causas evitables correspondieron a 3.350. Por la Lista Reducida de Tabulación de Causas de Mortalidad Infantil, 3.788 de las muertes tabuladas corresponden a tal clasificación. **Conclusión:** Las muertes perinatales de la Región Metropolitana de la Grande Vitória, considerando las clasificaciones de evitabilidad, presentaron mayor ocurrencia en consecuencia de una adecuada atención a la mujer en el parto.

**Descritores:** Mortalidad Infantil; Pérdida Perinatal; Mortinato; Atención Materno-Infantil.

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## INTRODUCTION

Infant deaths have long been regarded as a public health issue, given the goal of reducing infant mortality and improving health indicators. This discussion was driven by the Millennium Development Goals, which aimed to reduce the under-five mortality rate by two-thirds between 1990 and 2015<sup>(1)</sup>.

In Brazil, there has been a significant reduction in infant mortality rates over the past few decades. In 1982, the rate was 71.3 per 1,000 live births, decreasing to 14 per 1,000 in 2015, an 80.4% reduction. During the same period, neonatal mortality also dropped from 33.4 to 8.2 per 1,000 live births, a reduction of 63.4%. However, this reduction was 17% lower compared to the decrease in overall infant mortality. Among neonatal deaths, early neonatal mortality (within the first six days of life) declined more slowly than late neonatal mortality (between seven and 28 days). Regarding fetal mortality, the rate rose from 8.19 per 1,000 in 1996 to 9.5 per 1,000 in 2015. Since 2000, this rate has remained stable in Brazil and across all regions<sup>(2)</sup>.

To reduce infant mortality rates, it was necessary to develop health strategies that could address social inequalities. An example is the Bolsa Família program, which aims to assist families living in extreme poverty, helping reduce income inequality, improving the biological conditions of mothers and children, enhancing environmental and social conditions, and increasing the use of preventive services. Additionally, factors such as decreasing illiteracy rates, improving sanitation conditions, and advancing education played a role in this reduction<sup>(3)</sup>.

Another approach to combating infant mortality includes the implementation of actions such as the United Nations Sustainable Development Goals (SDGs), which focus on health initiatives aimed at reducing infant mortality, particularly eradicating neonatal deaths caused by preventable factors<sup>(4,5)</sup>.

In this context, perinatal mortality refers to fetal deaths occurring from the 22nd week of pregnancy and neonatal deaths that occur within the first six days of life. These indicators are crucial for evaluating obstetric and neonatal care services and for understanding the social determinants affecting the population, including the conditions in which people live and work<sup>(6)</sup>.

Each year, more than 7.6 million perinatal deaths occur worldwide, with 98% of these deaths happening in developing countries<sup>(6)</sup>. In many underdeveloped nations, for every neonatal death, there is another fetal death<sup>(7)</sup>. Data reveals significant progress in early childhood care in the most vulnerable neighborhoods of Vitória, Espírito Santo. Neonatal mortality rates have decreased throughout the municipality, including in the three regions with the highest rates of birth-related deaths. In Forte São João, deaths per 1,000 live births dropped from 7.75 to 3.60. In Maruípe, the reduction was from 5.11 to 4.21, and in São Pedro, from 7.35 to 5.93 per 1,000 live births. Despite these advances, it is important to note that these areas still account for about 70% of infant deaths within the first month of life in Vitória.

Preventable deaths are considered “sentinel events,” characterized by undesirable occurrences that could have been avoided with available technological resources or would not have happened if health services were functioning properly. Reducing these rates is an achievable goal, as there are known preventable factors, such as low birth weight and inadequate prenatal care<sup>(7,8,9)</sup>.

Thus, understanding perinatal mortality rates and their determinants can assist administrative sectors and health services in improving maternal and infant care planning, as well as in evaluating public policies. By implementing public health policies focused on preventing complications during pregnancy, childbirth, and postpartum, improving access to quality prenatal care, enhancing health surveillance and promotion, and providing adequate healthcare, as well as focusing on health education and professional training, perinatal mortality rates can be significantly reduced<sup>(10)</sup>.

Therefore, this study is justified by the increasing number of perinatal deaths contributing to infant mortality and the recognition of their preventability. The goal is to identify factors that can improve perinatal indicators and guide health practices. Understanding perinatal deaths in relation to the context of the pregnant woman’s life can deepen healthcare professionals’ knowledge of this complex phenomenon and help strengthen and develop health education initiatives.

Based on the reflections above, the question arises: How is perinatal mortality distributed in the Greater Vitória Metropolitan Region? The hypothesis is that, although perinatal mortality rates are declining, it is essential to understand the regional classification of preventable causes to foster debate and intervention in the local context, as the issue remains relevant in public health settings. Therefore, this study aims to analyze perinatal deaths in the Greater Vitória Metropolitan Region and classify them in terms of their preventability.

## METHOD

This is an ecological and descriptive study with a quantitative approach, divided into two phases. Phase I involved collecting secondary data and using spatial analysis techniques to characterize perinatal mortality in the Greater Vitória Metropolitan Region. Phase II focused on describing the epidemiological profile of perinatal mortality from the perspective of preventability.

The study was conducted in the municipalities of the Greater Vitória Metropolitan Region (GVMR) in the state of Espírito Santo, which includes seven main municipalities representing nearly 50% of the state’s total population. These municipalities are Serra, the most populous municipality with around 520,653 inhabitants; Vila Velha, the state’s oldest city with 467,722 residents, primarily supported by port activities; Cariacica, which balances urban and rural elements, with a population of 353,491; Vitória, the capital of Espírito Santo with 322,869 residents, one of Brazil’s fastest-growing capitals economically; Guarapari, a coastal municipality with 124,656 residents, recently recognized as the safest city in Espírito Santo (2023); Viana, part of the metropolitan region but with a more rural character, housing 73,423 residents; Fundão, the smallest of the municipalities with 18,014 residents.

Phases I and II were based exclusively on health information systems, identifying the main preventable causes of perinatal deaths.

In **Phase I**, the study population consisted of perinatal deaths (both fetal and early neonatal) from the municipalities of the Greater Vitória Metropolitan Region.

In **Phase II**, data were collected from the Mortality Information System (SIM) regarding deaths, and from the Live Births Information System (SINASC) to identify the number of live births necessary to calculate perinatal mortality. Causes of death were categorized according to those related to perinatal deaths.

Variables for **Phase I** were extracted from SIM, SINASC, and the Demographic Census of the Brazilian Institute of Geography and Statistics (IBGE). These variables included maternal age, gestational age, newborn or fetal sex, birth weight, congenital malformations, multiple pregnancies, prenatal care, type of delivery, maternal education, maternal occupation, place of residence, and the type of hospital where the birth occurred (public or private).

In **Phase II**, perinatal deaths were evaluated using preventability criteria for each classification.

For both phases, quantitative data were extracted from SIM and SINASC. To prevent underreporting and data inconsistencies, updated information and supplementary data were requested from the Espírito Santo State Health Department.

Data processing initially involved verifying the distribution of data in the SIM and SINASC databases. Next, data filtering was performed by removing outliers, normalizing, and rescaling the datasets. Following this, the most correlated variables were identified to avoid unnecessary repetition during regression analysis.

The frequency and perinatal coefficient were determined, followed by a univariate exploratory analysis of the rates, examining distribution type, central tendency, and dispersion measures.

Data were first stored in a spreadsheet and then transferred to the Statistical Package for the Social Sciences (SPSS), version 23, for statistical analysis. For multivariate analysis, simple linear regression was conducted to measure the increase in mortality rates for each city within the GVMR.

Preventability of deaths was assessed using five classifications:

The classification system from the São Paulo State Data Analysis System Foundation (SEADE) has been widely used in Brazil to classify infant deaths. This method, developed by Luis Patrício Ortiz, was designed to assess the health conditions of the population in São Paulo and examine the preventability of deaths based on disease causes. SEADE was the first classification system for infant deaths that proposed categorizing deaths as preventable, non-preventable, and poorly defined<sup>(9)</sup>.

Preventable causes are divided into eight groups, based on the underlying cause of infant death, following the ICD-10 classification. These groups are organized for children under five years of age as follows: Group 1: Preventable by immunization; Group 2: Preventable by adequate pregnancy monitoring; Group 3: Preventable by appropriate childbirth care; Group 4: Preventable by early prevention, diagnosis, and treatment; Group 5: Preventable through partnerships with other sectors; Group 6: Non-preventable; Group 7: Poorly defined; Group 8: Unclassified/other<sup>(9)</sup>.

The List of Preventable Causes of Death by Interventions (LBCE) within Brazil's Unified Health System (SUS) was established in 2007, aiming to organize deaths based on groups of underlying causes, as classified by the International Classification of Diseases (ICD)<sup>(10,11)</sup>.

The Brazilian List of Preventable Deaths was developed through a literature review of the conceptual and empirical foundations of preventable death causes. It was created by a working group of specialists from various fields, coordinated by the Ministry of Health<sup>(12)</sup>.

Under the coordination of the Secretariat of Health Surveillance within Brazilian Ministry of Health, relevant specialists debated and systematized concepts and methodologies to construct a national list of preventable deaths, categorized by age groups. This effort resulted in two lists of preventable deaths: one for children under five and another for individuals aged five to 64, based on the technology available within SUS<sup>(9,12)</sup>.

The Brazilian List of Preventable Causes of Death was updated by Malta et al. (2010) and is divided into three sections: preventable deaths, deaths from poorly defined causes, and other (non-preventable) causes<sup>(12)</sup>.

Preventable causes of death are further classified into four groups: (I) Preventable by immunization actions; (II) Preventable by adequate care for women during pregnancy and childbirth, and for newborns; (III) Preventable by appropriate diagnostic and treatment actions; (IV) Preventable by adequate health promotion actions, linked to appropriate health care. The causes preventable by adequate care for women during pregnancy and childbirth, and for newborns, are subdivided into: preventable by adequate care for women during pregnancy; preventable by adequate care for women during childbirth; preventable by adequate care for newborns<sup>(9)</sup>. Thus, the LBCE represents a significant advance in the analysis of preventability in Brazil, as it considers the technology available within SUS<sup>(13)</sup>.

These lists suggest future revisions to keep pace with advancements in health technology. The most recent revision of the Brazilian List, completed in 2010, is currently being used in studies with data from the Mortality Information System. These studies are based on corrected death records for underreporting and the redistribution of poorly defined causes among all causes, according to results from active death searches<sup>(13)</sup>.

The Taucher Classification, created in 1979 by Erica Taucher, is the oldest among the existing classifications. Instead of listing specific diseases, Taucher introduced a set of criteria for determining preventable deaths, taking into account family living conditions, socioeconomic status, maternal education, the child's nutritional status, and access to health services to assess preventability<sup>(14)</sup>.

The development of the Taucher Classification was based on the 9th International Classification of Diseases (ICD-9) and is divided into three categories: preventable deaths, non-preventable deaths, and deaths from unknown causes. The preventable deaths category is further subdivided into deaths in children under 28 days old and deaths in children aged 28 days to 11 months. These are classified into subcategories such as: causes preventable by adequate pregnancy

monitoring; causes preventable by proper care during childbirth; causes preventable by early diagnosis and medical treatment; causes preventable by complete nutrition; causes preventable by good sanitation conditions; causes preventable by reducing maternal parity; other significant preventable causes; causes preventable through prevention measures<sup>(14)</sup>

The Reduced Tabulation List of Infant Mortality Causes (LIR-MI) was developed based on the expanded Wigglesworth Classification (1980), the World Health Organization (WHO), and the Lawn et al. Classification (2000), all of which are grounded in the ICD-10. This classification aims to highlight groups according to their relevance for guiding health interventions focused on preventing issues related to maternal care, childbirth, newborn care, and child health during the first year of life<sup>(9,15,16)</sup>.

For infant deaths, when considering maternal causes, pregnancy, and respiratory conditions, ten groups are identified: prematurity, infections, asphyxia/hypoxia, congenital malformations, respiratory conditions of the newborn, maternal factors related to pregnancy, cardiorespiratory disorders originating in the perinatal period, conditions originating in the perinatal period, poorly defined causes, and other causes<sup>(9)</sup>.

The International Collaborative Effort on Infant Mortality (ICE) classification covers causes of death within the first year of a baby's life but does not include stillbirths. Causes of death are grouped into congenital, asphyxia, immaturity, infection, sudden infant death syndrome (SIDS), external causes, specific conditions, and other causes<sup>(14)</sup>.

Based on the Wigglesworth classification, ICE was introduced in 1989 with a similar methodology to facilitate the comparison of information between countries. In its design, causes such as sudden death, external causes, and infection were added<sup>(9)</sup>.

Regarding ethical and legal considerations, the study was approved by the State Health Department (SESA) of Espírito Santo and received approval from the Human Research Ethics Committee under opinion number 2.738.639. The study complies with all the requirements of Resolution 466/12 of the Brazilian National Health Council (CNS) concerning research involving human beings.

## RESULTS

In analyzing the underlying causes of perinatal deaths in the Greater Vitória Metropolitan Region, among the 4,010 cases, it was found that 25.99% were due to fetuses and newborns affected by complications of the placenta, umbilical cord, and membranes. This was followed by fetuses and newborns affected by maternal conditions not necessarily related to the current pregnancy, accounting for 25.14%. Other notable causes include intrauterine hypoxia (8.60%) and fetuses and newborns affected by maternal complications of pregnancy (8.43%). Congenital malformations were among the causes with the lowest occurrence.

Regarding preventability, according to the São Paulo State Data Analysis System Foundation (SEADE) classification, 92.69% of deaths were deemed preventable, with the highest concentration in deaths preventable through adequate childbirth care, followed by those preventable through proper pregnancy monitoring (36.53%). Only 4.69% of deaths were classified as non-preventable, and 2.62% were categorized as poorly defined, as shown in Table I.

**Table I** - Classification of perinatal deaths by preventability based on SEADE in the Greater Vitória Metropolitan Region from 2008 to 2017. Vitória, Espírito Santo, Brazil.

SEADE	N	%
Preventable – reducible through partnerships with other sectors	372	9,28
Preventable – reducible through early prevention, diagnosis, and treatment	258	6,43
Preventable – reducible through adequate care during childbirth	1622	40,45
Preventable – reducible through proper pregnancy monitoring	1465	36,53
Poorly defined	105	2,62
Non-preventable	188	4,69

Legend: SEADE (São Paulo State Data Analysis System Foundation)

According to Table II, in terms of the preventability classification based on the List of Preventable Causes of Death by Interventions (LBCE), 76.61% of perinatal deaths were considered preventable, with the highest occurrence in the category of deaths reducible by adequate care for women during childbirth. Of the total deaths, 23.39% were

classified as poorly defined causes, and none were categorized as “other causes,” which represent deaths not clearly preventable.

**Table II.** Classification of perinatal deaths by preventability based on LBCE in the Greater Vitória Metropolitan region from 2008 to 2017. Vitória, Espírito Santo, Brazil.

LBCE	N	%
Poorly defined causes	938	23,39
Preventable through adequate diagnosis and treatment	314	7,83
Preventable through appropriate health promotion actions linked to adequate healthcare	79	1,97
Preventable through adequate care during childbirth	2155	53,74
Preventable through adequate care for the newborn	524	13,07

Legend: LBCE (List of Preventable Causes of Death by Interventions)

In relation to the Taucher classification, the number of perinatal deaths due to preventable causes amounted to 3,350. Of these, 3,169 (79.03%) were preventable through adequate care during childbirth, 65 (1.62%) through the reduction of significant causes, 58 (1.45%) through proper pregnancy monitoring, 24 (0.60%) through early diagnosis and medical treatment, 17 (0.42%) through the reduction of maternal parity, 16 (0.40%) through preventive measures, and 1 (0.02%) death was attributed to fetuses and newborns affected by maternal hypertensive disorders (Table III).

**Tabela III.** Classification of perinatal deaths by preventability based on Taucher in the Greater Vitória Metropolitan Region from 2008 to 2017. Vitória, Espírito Santo, Brazil.

TAUCHER	N	%
Preventable through preventive measures	16	0,40
Preventable through adequate care during childbirth	3169	79,03
Preventable through proper pregnancy monitoring	58	1,45
Preventable through early diagnosis and medical treatment	24	0,60
Preventable through reduction of maternal parity	17	0,42
Fetus and newborn affected by maternal hypertensive disorders	1	0,02
Poorly defined causes	111	2,77
Non-preventable causes	549	13,69
Other significant preventable causes	65	1,62

According to the Reduced Tabulation List of Causes of Infant Mortality (LIR-MI), 3,788 of the tabulated deaths fall under this classification. Of these deaths: 1,871 (46.66%) resulted from failures in maternal healthcare during prenatal care; 968 (24.14%) were due to the absence of prevention and management of obstetric complications during childbirth; 558 (13.92%) were related to the screening, diagnosis during pregnancy, and treatment of potentially treatable conditions during prenatal care; 226 (5.64%) involved prenatal care, assistance during labor, and newborn care; 165 (4.11%) were due to prenatal care, obstetric management, and newborn care assistance (Table IV).

**Tabela IV.** Classification of perinatal deaths by preventability based on LIR-MI in the Greater Vitória Metropolitan Region from 2008 to 2017. Vitória, Espírito Santo, Brazil.

LIR- MI	N	%
Women’s health care during prenatal care (prevention, timely detection, and treatment)	1,871	46,66
Prenatal care (prevention); Labor care (prevention); Newborn prevention and care	226	5,64
Prenatal care (prevention); Obstetric management (lung immaturity approach); Preterm newborn care	165	4,11
Prenatal care (screening, pregnancy diagnosis, procedures for treatable conditions)	558	13,92
Prevention and obstetric management of childbirth complications	968	24,14
Non-preventable	122	3,04
Poorly defined	100	2,49

Legend: LIR-MI (Reduced Tabulation List of Infant Mortality Causes)

According to the International Collaborative Effort on Infant Mortality (ICE) classification, as shown in Table V, a total of 3,556 infant deaths were recorded. Among these, the following causes were identified: 1,321 deaths (32.94%) due to immaturity, 1,230 deaths (30.67%) due to asphyxia, 497 deaths (12.39%) from external causes, 355 deaths (8.85%) from other causes, and 153 deaths (3.82%) from congenital causes.

**Table V.** Classification of perinatal deaths by preventability based on ICE in the Greater Vitória Metropolitan Region from 2008 to 2017. Vitória, Espírito Santo, Brazil.

ICE	N	%
Preventable – asphyxia	1,230	30.67
Preventable – external causes	497	12.39
Preventable – congenital causes	153	3.82
Preventable – other causes	355	8.85
Preventable – immaturity	1321	32.94
Poorly defined	68	1.70
Non-preventable – asphyxia	3	0.07
Non-preventable – congenital causes	128	3.19
Non-preventable – other causes	204	5.09
Non-preventable – infections	14	0.35
Non-preventable – sudden infant death	37	0.92

Legend: ICE (International Collaborative Effort on Infant Mortality)

## DISCUSSION

The analysis of the results revealed that most perinatal deaths in the Greater Vitória Metropolitan Region from 2008 to 2017 were due to potentially preventable factors. Regardless of the classification method used, a large proportion of perinatal deaths in the region resulted from inadequate care provided during childbirth and prenatal care. This underscores the importance of analyzing various methods for classifying the preventability of perinatal deaths to guide interventions focused on reducing preventable mortality.

Investing in prenatal care and care at the time of birth can significantly reduce mortality rates. According to the World Health Organization (WHO), providing widespread care during birth, particularly with a focus on premature and ill newborns, could save nearly three million lives annually, including those of women, newborns, and fetuses.

Globally, there are an estimated four to five million perinatal deaths each year. The quality of care provided by health professionals during prenatal, childbirth, and postpartum care is a critical factor in the preventability of these deaths, as recommended by public policies focused on maternal and child health care<sup>(10,17)</sup>.

In line with the findings of this study, research conducted in São Paulo and Rio de Janeiro showed that of the 98 perinatal deaths recorded over several months in 2011, 61.2% were due to preventable causes. However, reducing these numbers would require pregnant women to receive more adequate care throughout their prenatal period<sup>(19)</sup>.

Regarding the classification of the analyzed deaths, there was a predominance of preventable deaths due to adequate care for women during childbirth in both classifications used to assess the preventability of perinatal deaths. This was followed by deaths preventable through proper pregnancy monitoring according to the SEADE classification, and deaths preventable through adequate care for the newborn according to the LBCE classification. There was a higher number of preventable deaths according to the SEADE classification compared to LBCE.

In a study conducted between September and November 2011 in various maternity hospitals in the states of Rio de Janeiro and São Paulo, 98 perinatal deaths were recorded. Analyzing the distribution of these deaths showed that 61.2% were due to preventable causes, with most deaths falling under the categories of deaths preventable through adequate care for women during pregnancy (38 out of 60 deaths) and appropriate care during childbirth (18 deaths)<sup>(19)</sup>.

In the maternity hospitals analyzed in downtown São Paulo and Rio de Janeiro, as in the previous study, the category of deaths preventable through adequate care for women during pregnancy was also the primary category identified in cases of perinatal mortality<sup>(19)</sup>.

According to the SEADE preventability classification, deaths would primarily be reducible through prevention, early diagnosis, and treatment actions, followed by preventable deaths through adequate pregnancy monitoring<sup>(9)</sup>.

Despite various scientific evidence, including guidelines and care protocols for mother and baby, many barriers to access still exist, making it difficult to provide comprehensive, humanized care of the required quality. This reveals the need for changes in childbirth care practices. Since the birth of a child is an immensely significant event in a woman's life, the quality of care provided during childbirth, when given with sensitivity and respect, directly contributes to a positive or negative experience, potentially leaving an indelible mark on the individual<sup>(20,21)</sup>.

The promotion of maternal health begins with universal access to quality prenatal care. Regular prenatal consultations monitor fetal development and allow for the early detection of medical conditions that could affect the health of both the mother and the baby. Health education on proper nutrition, healthy habits, and warning signs during pregnancy are essential to ensuring timely and necessary care.

Public policies are essential to sustaining health promotion and prevention initiatives. These include investments in healthcare infrastructure, training of healthcare professionals, and continuous community education on preventive health practices. Collaboration between governments, non-governmental organizations, and the private sector is crucial to ensuring equal access to quality healthcare for all pregnant women and babies, regardless of geographic location or socioeconomic status.

Regarding the deaths that occurred during childbirth care, there is a clear need to eliminate harmful or ineffective practices—those that lack sufficient scientific evidence and are not aligned with widely accepted recommendations for safe obstetric care<sup>(21)</sup>.

There remains ongoing debate about the frequent use of abusive and ineffective interventions during childbirth care, which can result in adverse outcomes. Gaps still exist between available scientific evidence and actual practice in labor and delivery care. Therefore, it is essential to implement substantial changes in professional practice, grounded in the principle of preventing harm, to ensure quality and improvement in care.

It is the full responsibility of the healthcare team to ensure that, from the moment a woman is admitted for delivery, the necessary technologies for pain control, patient choices, and emotional support are utilized. Interventions should only be performed when justified, according to established protocols.

Within the ICE and LIR-MI classifications, deaths that could be reduced through adequate care during childbirth point to potential deficiencies in prenatal care, obstetric management, and newborn care. This highlights a paradox in Brazil, where illness and death occur either due to a lack of appropriate technology or its excessive and improper use. For causes preventable through early diagnosis and treatment, these classifications identified congenital malformations as resulting from failures in screening and diagnosis during pregnancy<sup>(9)</sup>.

Regarding deaths that could be prevented through immunization, as indicated in the classifications, the low numbers suggest that the Brazilian National Immunization Plan has been effective in its preventive role. Additionally, there has been a reduction in deaths related to health promotion actions, a result of the expanding coverage of sewage and treated water networks<sup>(9)</sup>.

Over the years, the causes of neonatal deaths have shifted, with perinatal causes now being the primary factor, surpassing infectious diseases. Infant deaths are considered sentinel events—deaths that should not occur in the presence of available technology, or that result from failures in health care. This scenario is directly linked to the social determinants of health, presenting a challenge for public health in establishing a preventability classification that fully encompasses them<sup>(14)</sup>.

This research highlights that in the ICE classification, there is a higher occurrence of neonatal deaths from preventable causes, with immaturity being the leading cause, followed by asphyxia. This points to deficiencies in the monitoring of newborns' lives, a lack of professional preparation and training, or even insufficient individualized attention to each pregnant woman. Additionally, the inappropriate use of technologies and procedures negatively impacts the life of these individuals.

Expanding primary care services plays a critical role in combating infant mortality, as these services focus on family planning, prenatal care, and newborn care, which help reduce deaths and ensure early identification and treatment of at-risk populations. However, many challenges remain, such as the low prioritization of health promotion and prevention actions, high staff turnover, lack of professional training, organizational issues, and insufficient financial investments<sup>(23,24)</sup>.

Given the importance of analyzing the quality of care provided by health professionals in maternal and child health, the "Nascer no Brasil II" study evaluates the knowledge and attitudes of professionals during childbirth, aiming



to identify the main barriers and facilitators for the implementation of care guidelines. This can lead to improvements in professional practice and health services<sup>(25)</sup>.

Thus, it is crucial to analyze deaths based on their preventability classification to understand the root causes and guide interventions to minimize perinatal death rates. This approach is relevant for public health worldwide, and countries should prioritize and publicize their preventive actions. By doing so, they can more effectively address preventable deaths<sup>(9)</sup>.

It is understood that the use of lists of causes of death is a fundamental tool for assessing the effectiveness of health services and for identifying measures to reduce infant mortality from preventable causes. Health education plays a key role as a tool for social change, involving individuals in the health-disease process. This approach can be implemented across all primary healthcare services by all health care workers<sup>(26)</sup>.

Additionally, Permanent Education (PE) is an ongoing educational process, acting as continuous professional development by promoting reflection on work and learning in the workplace. It encourages collective and collaborative learning among teams, fostering horizontal dialogue, social participation, and the exchange of knowledge and experiences. Permanent Health Education (PHE) aims to break away from traditional teaching models to build interprofessional relationships that impact real-world outcomes in local communities<sup>(27)</sup>.

The study has intrinsic limitations associated with the use of secondary data, particularly due to the possibility of underreporting. However, these limitations do not invalidate the findings, as steps were taken to standardize the data and collect information directly from the information management sector. The evaluated data provide a crucial reference point for understanding preventable causes and guiding health-related decision-making.

## CONCLUSION

Perinatal deaths in the Greater Vitória Metropolitan Region, Espírito Santo, were extensively analyzed using various preventability classifications, revealing a predominance of deaths related to inadequate care for women during childbirth. According to the classifications from SEADE, LBCE, Taucher, LIR-MI, and ICE, a significant proportion of perinatal deaths were attributed to preventable causes, highlighting failures in obstetric management and prenatal care.

According to the SEADE classification, most deaths were considered preventable, as was the case with the LBCE classification, particularly in terms of adequate care for women during childbirth. Taucher identified that more than half of the deaths could have been reduced with better childbirth care, while the LIR-MI classification emphasized that many deaths were associated with deficiencies in women prenatal care.

Additionally, the ICE classification indicated that almost half of the perinatal deaths were due to immaturity, with another portion caused by asphyxia, both of which could have been prevented with proper care during childbirth and prenatal care. These high rates of preventable deaths point to significant gaps in the care provided to women during pregnancy and childbirth.

Thus, it is crucial to invest in strong institutional support and for healthcare professionals to commit to improving the quality of care provided to pregnant women. Continuous training programs, improvements in health care infrastructure, and the implementation of strict prenatal and childbirth care protocols are essential measures to reduce perinatal mortality rates in the region. Additionally, integrating health services with other sectors, such as education and social services, can contribute to more holistic and effective care, addressing the socioeconomic factors that also impact maternal and neonatal health.

These actions are fundamental to ensuring that pregnant women receive quality health care, preventing complications and significantly reducing perinatal mortality, thus promoting a safer and healthier environment for mothers and newborns in the Greater Vitória Metropolitan Region.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## CONTRIBUTIONS

All authors contributed equally to the project.

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**Address for correspondence**

Ana Paula de Araújo Machado

Escola Superior de Ciências da Santa Casa de Misericórdia de Vitória, EMESCAM

Av. N. S. da Penha, 2190

Bairro: Santa Luíza

CEP: 29045-402 / Vitória (ES) - Brasil

E-mail: [anapaula.araujom@outlook.com](mailto:anapaula.araujom@outlook.com)

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