

ANALYSIS OF PERINATAL MORTALITY AND ITS ASSOCIATED FACTORS

ANÁLISE DA MORTALIDADE PERINATAL E SEUS FATORES ASSOCIADOS

ANÁLISIS DE LA MORTALIDAD PERINATAL Y SUS FACTORES ASOCIADOS

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Objective: to analyze Perinatal Mortality and its associated factors in the state of Paraná, Brazil. **Method:** cross-sectional analytical research, using secondary data from the Information System on Live Births and Mortality. The Perinatal Mortality Rate was calculated between 2006 and 2014 and analyzed the independent variables related to deaths with the chi-square test. **Results:** Perinatal Mortality decreased by 11.7%, maintaining the predominance of fetal deaths in relation to early neonates, as well as significance in relation to maternal schooling ($p=0.016$) and low weight ($p=0.000$). **Conclusion:** it was identified that the Perinatal Mortality Rate suffered a continuous and slow reduction during the period of nine years in Paraná.

Descriptors: Perinatal Mortality. Fetal Mortality. Indicators. Health Information Systems. Public Health.

Objetivo: analisar a Mortalidade Perinatal e seus fatores associados no estado do Paraná, Brasil. *Método:* pesquisa transversal analítica, com dados secundários do Sistema de Informação sobre Nascidos Vivos e Mortalidade. Foi calculada a Taxa de Mortalidade Perinatal, entre 2006 e 2014, e analisadas as variáveis independentes relativas aos óbitos com o teste qui-quadrado. *Resultados:* a mortalidade perinatal apresentou redução de 11,7%, mantendo a predominância dos óbitos fetais em relação aos neonatais precoces, bem como significância em relação à escolaridade materna ($p=0,016$) e o baixo peso ($p=0,000$). *Conclusão:* identificou-se que a Taxa de Mortalidade Perinatal sofreu redução contínua e lenta no Paraná, durante nove anos.

Descritores: Mortalidade Perinatal. Mortalidade Fetal. Indicadores. Sistemas de Informação em Saúde. Saúde Pública.

Objetivo: analizar la Mortalidad Perinatal y sus factores asociados en el estado de Paraná, Brasil. *Método:* Investigación transversal analítica, con datos secundarios del Sistema de Información sobre Nacidos Vivos y Mortalidad. Se calculó la Tasa de Mortalidad Perinatal, entre 2006 y 2014, y se analizaron las variables independientes relativas a los óbitos con la prueba Chi-cuadrado. *Resultados:* la mortalidad perinatal presentó reducción de 11,7%, manteniendo la predominancia de los óbitos fetales en relación a los neonatales precoces, así como la significancia en relación a la escolaridad materna ($p=0,016$) y al bajo peso ($p=0,000$). *Conclusión:* se identificó que la Tasa de Mortalidad Perinatal ha sufrido reducción continua y lenta en Paraná, durante nueve años.

Descriptores: Mortalidad Perinatal. Mortalidad Fetal. Indicadores. Sistemas de Información en Salud. Salud Pública.

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Introduction

Perinatal Mortality comprises the deaths occurring from the 22nd week of gestation until the seventh full day of life. Therefore, this health indicator is composed of the Fetal and Neonatal Precocious death component, which, respectively, occur before birth in the intrauterine environment, generating the condition of birth dead or stillborn, until the seventh day of life of the child who was born alive⁽¹⁾.

The neonatal component, especially the precocious one, persists as the largest proportion in Infant Mortality, in spite of the globally significant reduction of this indicator. Among the main causes of neonatal death, events, such as prematurity (35%), intrapartum (24%), sepsis and meningitis (15%), which could have been prevented by actions to prevent and promote quality of prenatal care, labor and delivery, are observed⁽²⁾.

International publications on global health emphasize the relationship of neonatal deaths with low maternal schooling, as it impacts on employability and family remuneration, and impacts on adherence to health promotion actions⁽²⁾. Elevation in the incidence of congenital anomalies has been observed in cases of infections and in intrauterine growth restriction, which add to the unsatisfactory quality of care⁽³⁾.

A Brazilian cohort study, performed with pregnant women attending the Unified Health System, related to the perinatal outcome related to pregnancy complications, concluded that infection, hypertensive disease and diabetes favored perinatal death, prematurity, and low birth weight⁽⁴⁾. From this perspective, the close relationship between obstetric factors and the causes of early fetal and neonatal deaths is demonstrated. Thus, perinatal deaths are potentially preventable events, considering the response of these events to the quality of prenatal care and delivery⁽⁵⁾.

On the other hand, prematurity, which strongly impacts on Perinatal Mortality, can be minimized with the expressiveness of actions that incorporate from family planning, with

opportune access to contraceptive methods, to attention in the pregnancy cycle and birth based on the best scientific evidences applied in the clinical protocols. In hospital care, among the evidences for reducing the consequences of prematurity, corticosteroids are used to prevent respiratory discomfort in premature infants⁽⁶⁾, and the amplification of access to specialized care.

With focus on the survival and health of the populations, it is urgent to identify strategies that sustain the reduction of Perinatal Mortality. This need points to a better understanding of the factors associated with perinatal deaths with the production of local evidence to support processes for the evaluation of public health policies around the world⁽³⁾. As a result and goal of the process, the (re)planning of maternal and child health care is put in place, in order to corroborate the continuity of the reduction of preventable perinatal deaths, with a positive impact on Infant Mortality.

Thus, the problem of this research is justified by the production of local evidence at the state level, facing the question: What factors involve the occurrence of early fetal and neonatal deaths that may suggest preventive interventions? The objective of the study is to analyze the Perinatal Mortality and its associated factors in the state of Paraná, Brazil.

Method

This is a cross-sectional analytical study⁽⁷⁾, carried out with data from the period 2006 to 2014, whose population was composed of children who died before birth (fetal deaths) and in the early neonatal period (early neonatal deaths) denominated perinatal period, who are children of women living in the state of Paraná, Brazil.

Secondary data from the study population, provided by the Department of Informatics of the Brazilian Unified Health System (DATASUS)⁽⁸⁾, which were accessed in January 2016, were analyzed.

Therefore, live births were obtained using a filter from the Live Birth Information System (SINASC) and the early neonatal deaths, with their independent variables, from the Mortality Information System (MIS), including those occurring between 1/1/2014 and 12/31/2014 (total of 2,328 events), in addition to the variables: maternal age and schooling, previous living children, previous deceased children, pregnancy type, sex, weight, gestational age, and type of delivery.

For the calculation of the dependent variable, the Perinatal Mortality Rate (PMR), which is the ratio between the absolute number of deaths that occurred between the 22nd week of gestation until the sixth day of life and the total number of live births added to the fetal deaths, was considered. For the Fetal Mortality Rate (FMR), the calculation was made based on the ratio between the intrauterine deaths from the 22nd week and the live births together with the fetal deaths. Finally, for the Early Neonatal Mortality Rate (ENMR), the calculation was based on the ratio of deaths of newborns who died to the seventh full day of life, by the total number of live births⁽⁹⁾.

To avoid rate fluctuations, due to the small numbers of events, data and rates were organized in three three-year periods, namely: 1st Triennium - 2006 to 2008; 2nd Triennium - 2009 to 2011; and 3rd Triennium - 2012 to 2014. Under the rationale for the organization of health services in the Health Care Network (*Rede de Atenção à Saúde* – RAS), among the 399 municipalities in the state, the 22 Regionals of Health (*Regionais de Saúde* – RS) of the state of Paraná were adopted as references of the maternal residence, which are organized in four macro-regions (MRS), namely: East, West, Northwest and North.

Descriptive analysis was used to determine the values of the rates and proportions and inferential analysis using the chi-square hypothesis test with a 95% confidence interval and a significance level of 5%. The types of deaths - early fetal and neonatal - were compared in relation to their independent variables, considering them as a factor associated with a confirmed ($p < 0.05$)

significance. To do so, the following tools were used for statistical support: Microsoft Office Excel[®] and RStudio[®] version 1.1.442 2009-2018.

For the elaboration of this research was used the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)⁽¹⁰⁾. The research was approved by the Research Ethics Committee of the Health Sciences Sector of the Federal University of Paraná, under Opinion No. 362,767 in 2013, as well as by the Ethics Committee of the Health Secretariat of the State of Paraná. It is in accordance with the ethical recommendations of Resolution No. 466, 2012⁽¹¹⁾.

Results

Regarding PMR, there was a decrease of 11.7%, which occurred in a slow and discrete manner from the 1st to the 3rd triennial, throughout Paraná, as a consequence of the reduction of the FMR in 7.7% and of the ENMR in 18.1% (Appendix A).

In the East MRS, a reduction of 11.2% of the PMR was identified, slightly lower than that of the state of Paraná. This MRS is composed by seven RSs, among them the 4th RS of Irati, which also presented a significant reduction of PMR (20.4%) and FMR (33.2%); it was the largest proportional reduction of all RSs in the state. It is also worth mentioning the reduction of the ENMR in 44.2% in the 1st RS of Paranaguá, which also composes the East MRS, as the largest decrease in this category, among all other RSs in the state (Appendix A).

Although in West MRS, there was a 12.7% reduction in PMR, a rise in FMR (10.6%) was observed in the 9th RS of Foz do Iguaçu (Appendix A).

The highest reduction in PMR in the state is evidenced in the Northwest MRS, of 13.0% and, mainly, the response to the quantity reduction of the FMR in 11.7%. Among the five RSs that make up this MRS, there was a significant reduction in PMR in the 14th RS of Paranavaí (26.7%), with an emphasis on the reduction of ENMR (35.5%). This RS presented the largest reduction in PMR when compared to the other RSs of the whole state. On the other hand, in this same MRS, the

low decreases in the 11th RS of Campo Mourão, with a reduction of the PMR in only 3.9%, without a variation for the FMR, and a reduction of only 8.5% in the ENMR (Appendix A).

In the North MRS, the reduction of PMR was 15.0%, superior to the one found in the state. This region includes the RS with the lowest decrease in PMR (1.6%), which was the 18th RS of Cornélio Procopio, and increased FMR by 20.8%.

It should be emphasized that the other RSs that presented an increase in FMR in the period were: the 16th RS of Apucarana and the 22nd RS of Ivaiporã, respectively, of 10.2% and 4.9% (Appendix A).

In 2014, in Paraná, there were 2,328 perinatal deaths, in which the mothers were between 20 and 34 years old (63.0%) and had eight years or more of schooling (60.4%). There was a distinct behavior between the type of death and maternal age; for the fetal, schooling was less

than eight years of schooling (53.7%) and for the early neonate, schooling was greater than or equal to eight years (65.3%).

Regarding the obstetric history of the mothers, they had up to two live children (82.0%) and there was no history of fetal loss in a previous gestation (59.1%). The gestations that resulted in death of the fetus or newborn were of the single type (88.9%) and vaginal birth was the main one (55.5%).

As to the characteristics of the fetus, the male gender (53.8%), premature (71.7%) and low weight (74.4%) predominated. However, there was a difference in terms of type of death in relation to weight: for the fetal, there was a greater proportion of low weight between 1,000 and 2,499 g (40.3%); in the early neonatal period, death was predominant in children under 1,000 g (41.2%).

Maternal schooling ($p=0.016$) and weight ($p=0.000$) presented as factors associated with perinatal death in the state of Paraná (Table 1).

Table 1 – Distribution of the independent variables of perinatal deaths according to the fetal and early neonatal component. Curitiba, Paraná, Brazil – 2014 (continued)

Variables	Fetal Deaths (N = 1.344)	Neonatal Deaths (N = 984)	Perinatal Deaths (N = 2.328)	p-value
	n (%)	n (%)	n (%)	
Mother's Age (years)				
Until 19	247 (18,4)	209 (21,2)	456 (19,3)	0,080
20 to 34	845 (62,9)	622 (63,2)	1.467 (63,0)	
> 35	189 (14,1)	114 (11,6)	303 (13,0)	
Uninformed	63 (4,7)	39 (4,0)	102 (4,4)	
Education (years)				
< 8	404 (53,7)	270 (27,4)	674 (29,0)	0,016*
> 8	762 (33,1)	643 (65,3)	1.405 (60,4)	
Uninformed	178 (13,2)	71 (7,2)	249 (10,7)	
Live Children				
< 2	1111 (82,7)	797 (81,0)	1.908 (82,0)	0,066
> 3	155 (11,5)	141 (14,3)	296 (12,7)	
Uninformed	78 (5,8)	46 (4,7)	124 (5,3)	
Fetal Losses				
No	648 (48,2)	729 (74,1)	1.377 (59,1)	1,323
Yes	601 (44,7)	192 (19,5)	793 (34,1)	
Uninformed	95 (7,1)	63 (6,4)	158 (6,8)	
Type of Pregnancy				
Single	1232 (91,7)	837 (85,1)	2.069 (88,9)	5,945
Multiple	87 (6,5)	123 (12,5)	210 (9,0)	
Uninformed	25 (1,9)	24 (2,4)	49 (2,1)	

Table 1 – Distribution of the independent variables of perinatal deaths according to the fetal and early neonatal component. Curitiba, Paraná, Brazil – 2014 (conclusion)

Variables	Fetal Deaths (N = 1.344)	Neonatal Deaths (N = 984)	Perinatal Deaths (N = 2.328)	p-value
	n (%)	n (%)	n (%)	
Sex				
Male	709 (52,8)	544 (55,3)	1.253 (53,8)	0,490
Female	606 (45,1)	437 (44,4)	1.043 (44,8)	
Uninformed	29 (2,2)	3 (0,3)	32 (1,4)	
Weight (g)				
< 1.000	435 (32,4)	405 (41,2)	840 (36,1)	0,000*
1.000 to 2.499	541 (40,3)	350 (35,6)	891 (38,3)	
> 2.500	316 (23,5)	203 (20,6)	519 (22,3)	
Uninformed	52 (3,9)	26 (2,6)	78 (3,4)	
Gestational Age				
< 37 Weeks	951 (70,8)	721 (73,3)	1.672 (71,8)	0,140
> 37 Weeks	316 (23,5)	205 (20,8)	521 (22,4)	
Uninformed	77 (5,7)	58 (5,9)	135 (5,8)	
Type of Delivery				
Vaginal	832 (61,9)	459 (46,6)	1.291 (55,5)	3,084
Surgical	478 (35,6)	496 (50,4)	974 (41,8)	
Uninformed	34 (2,5)	29 (2,9)	63 (2,7)	

Source: Created by the authors based on data from Brasil⁽⁶⁾.

* Chi-square test discards the null hypothesis, in which the type of death does not differ according to the variable.

Discussion

The slow reduction in PMR in the State of Paraná, analyzed with secondary data, instigated the understanding of the determinants of these deaths, mainly due to the predominance of fetal deaths. In this analysis, maternal schooling ($p=0.016$) and weight ($p=0.000$) were confirmed as factors associated with perinatal deaths. As to the incompleteness of these variables, they can be classified as good and excellent quality, respectively⁽¹²⁾.

For North American PMR indicators, in 2013, there were two distinct definitions for their calculation: the first one included deaths from 28 weeks to 7 days of life, with a result of 6.2 per thousand live births; and the second, observed the deaths occurred from 20 weeks to 28 days of life, with increase of the PMR to 9.9 per thousand live births⁽³⁾, values lower than that identified in the state of Paraná. However, the comparability between the results of the present study and the international results is fragile, due to the diversity

of classification of perinatal deaths, such as social and economic differences between countries. However, it is identified the need for strategies to maintain the reduction of these deaths in Paraná, to indicators of only one digit, as already identified in developed countries.

The health system in the United States is fragmented, not universal and presents a restrictive and impeditive financial logic⁽¹³⁾ for population access to health services. In Brazil, there are indicators that can be overcome by increasing equitable access to the population, with a focus on universality, with the overcoming of socioeconomic disparities in the different Brazilian regions supported by sustainable financing⁽⁶⁾.

In 2014, the United States applied 17.5% of GDP in health, a resource administered mainly by the private sector. However, the results were still unsatisfactory (Infant Mortality of 6.1 deaths per thousand live births) when compared to the United Kingdom, whose investment was lower, of 8.8% of GDP, and showed lower Infant

Mortality indicators (3.5 deaths per thousand live births)⁽¹⁴⁾. This disparity is possibly related to the fragmented aspects of health care provision.

As a strategy to reduce PMR, the Committees for the Prevention of Child and Fetal Death that seek to develop the work in partnership with the Epidemiological Surveillance services are pointed out. These services are focused on recognizing and knowing the sentinel event, the notification, the detailed analysis of the trajectory of maternal and child care from conception to death, which will allow the classification of the avoidability of the event, its associated factors and, consequently, the proposal for measures to prevent it. The recommendations applied must be acceptable for the prevention of a new event, under the same conditions in which each event analyzed occurred⁽¹⁵⁾. Paraná is recognized as a pioneer in the work of these committees. From this perspective, it can be assumed that its performance contributed to the reduction of PMR due to the monitoring and detailing of these events.

This fact can be observed in a descriptive study carried out between 1999 and 2010, which indicated a reduction of 28.2% in PMR in Paraná, with an emphasis on the reduction of the early neonatal component (32.2%), identifying rates stabilization after 2007, with variation between the predominance of early and fetal neonatal components in RS⁽¹⁶⁾.

A descriptive study in Recife concluded that 92.9% of the deaths investigated by these committees were considered avoidable, especially those occurred in the early neonatal period, according to the availability of interventions consolidated in the Unified Health System (*Sistema Único de Saúde* – SUS). It is emphasized that the investigations of infant deaths qualify the information of these vital events⁽¹⁷⁾. However, the predominance of the fetal component in PMR also determines the need to deepen the monitoring of fetal deaths⁽¹⁸⁾.

Despite the increase in prenatal coverage in Brazil, there are still inadequacies related to the quality of this service, such as the lack of laboratory tests and recommended basic

procedures⁽¹⁹⁾, influenced by the country's regional characteristics. Thus, it is estimated that investments in this area can favor a reduction of up to 70.0% in perinatal deaths^(6,17), making it possible to reach mortality indicators at values close to those identified in developed countries.

The need to develop preventive and health promotion actions linked to other social and education policies is reiterated, with a view to improving the quality of life, schooling, and poverty reduction. As a reflex action, a more significant reduction of PMR is expected in Paraná, with the maintenance of the criteria for risk stratification in prenatal care and delivery, which, in relation to maternal schooling, should be different for the type of death, as well as investments in maintaining avoidance of low weight deaths.

Socioeconomic inequalities must be overcome to maintain the reduction of PMR, as shown in the ecological study carried out in Pernambuco between 2009 and 2011, which identified a PMR of 18.8 deaths per thousand live births, which represents a higher mortality than that found in Paraná, but with a higher reduction (12.9%) than the one identified in the present study. The innovation and the technical-scientific improvement allow, over time, greater survival of newborns, even in the most complex cases. Therefore, greater availability of neonatal hospital beds and specialized equipment⁽²¹⁾ should be considered in all Brazilian regions.

Another study carried out in Salvador identified a higher PMR among those under 1,000 g, with gestational age lower than 27 weeks, and multiple gestation products⁽²²⁾. This fact suggests the difficulty of maintaining life in Neonatal Intensive Care Units, in spite of the technological and technical resources currently available, in addition to corroborating some findings of the present research, since it has evidenced a higher proportion of perinatal deaths among premature and low weight. Although prematurity has not been confirmed as a factor associated with perinatal death, it is closely related to another confirmed factor, low weight ($p=0.000$).

Therefore, the adequate number of prenatal consultations favors the reduction of PMR, by providing guidance to pregnant women regarding the recognition of signs of obstetric emergencies, the benefits of good nutrition and breastfeeding, damages of smoking, alcoholism, and drug addiction. At such time, tetanus immunization, prophylactic treatment for anemia, screening for syphilis and human immunodeficiency, identification and treatment of preeclampsia, eclampsia, infection, and vaginal bleeding should be considered. In addition, women should be encouraged to choose the mode of delivery and recognition of referral services⁽²³⁾.

Access to maternity at the time of delivery reduces early neonatal mortality by 36%, impacting on Perinatal Mortality, especially among the most vulnerable population. Therefore, it is recommended the availability of technology in obstetrical services, to enable the flow of pregnant women through the referral and counter-referral system, with the provision of transportation⁽²⁴⁾. These recommendations are contemplated by the implementation of the Logical model of the Network of Care for Maternal and Child Health, established according to the Stork Network, which pointed out the pilgrimage of pregnant women between maternities at the time of childbirth as a problem to be overcome.

Regarding the limitations of this study, they are related to the low completeness for the variable maternal occupation, which presented very poor quality (greater than 50%)⁽¹²⁾, making its analysis unfeasible. However, for the other variables, five of them presented excellent quality (incompleteness less than 5%) and four of good quality (5 to 10%). However, the variables were measured punctually, without the guarantee of temporal advance⁽⁷⁾, making it impossible to collect data on the conditions of prenatal care, delivery, birth, and care for the newborn. These conditions are not available in the Health Information Systems used in this research. Otherwise, they would allow an expanded understanding of the occurrence of perinatal death.

It should be emphasized that, in the work with secondary data of deaths, there is a documentary flow of data records and analytical process as it is a compulsory notification of the registration of the vital event; nevertheless, its reliability is not guaranteed. Consequently, as repercussions of the development of these studies, it is considered that the quality of records favors the production of epidemiological studies⁽¹⁸⁾ for the production of scientific evidence to support decision making for the implementation of health policies.

Conclusion

This study produced scientific evidence that can be applied to planning and prioritizing maternal and child care in the state of Paraná. Although a slow reduction was observed, the Perinatal Mortality Rate was gradual and the fetal component predominated as the main highlight for the confirmation of associated factors, such as maternal schooling and low perinatal death.

From this point of view, the analysis of perinatal deaths by the Committees for the Prevention of Maternal, Infant and Fetal Mortality, especially fetuses, weighing less than 2,500 g and children of mothers with less than eight years of schooling is endorsed. This analysis, coupled with the monitoring of deaths by Epidemiological Surveillance, can culminate in the production and dissemination of significant recommendations for the prevention of preventable early fetal and neonatal deaths and, thus, impact on health actions and public policies in order to minimize their occurrence.

Finally, the fragility in filling the variable maternal occupation in the Declaration of Death suggests the intensification of the process of permanent education in the health services, for the standardization of its completion and consequent increase in the quality of the information generated, considering the inclusion of occupancy codes in the MIS data dictionary.

Collaborations:

1. conception, design, analysis and interpretation of data: Michelle Thais Migoto, Rafael Pallisser de Oliveira and Márcia Helena de Souza Freire;

2. writing of the article and relevant critical review of intellectual content: Michelle Thais Migoto and Márcia Helena de Souza Freire;

3. final approval of the version to be published: Michelle Thais Migoto.

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Appendix A – Rate of Perinatal, fetal and neonatal Mortality according to Regional and Macroregional Health Departments. Paraná, Brazil – 2006-2014

MRS	RS	1st Triennium			2nd Triennium			3rd Triennium			Variation (%)		
		PMR	FMR	ENMR	PMR	FMR	ENMR	PMR	FMR	ENMR	PMR	FMR	ENMR
East	1st RS Paranaguá	20,0	10,8	9,3	20,3	12,4	7,9	15,6	10,5	5,2	-21,9	-2,8	-44,2
	2nd RS Metropolitana	14,4	8,4	6,1	14,1	8,4	5,8	13,7	8,2	5,6	-4,6	-1,9	-8,3
	3rd RS Ponta Grossa	18,7	10,5	8,3	18,4	10,5	7,9	15,5	9,3	6,3	-17,2	-11,5	-24,5
	4th RS Irati	18,5	12,4	6,2	17,2	10,2	7,0	14,7	8,3	6,5	-20,4	-33,2	5,5
	5th RS Guarapuava	22,1	12,8	9,4	23,2	13,1	10,2	18,6	10,8	7,9	-15,5	-15,7	-15,3
	6th RS União da Vitória	13,6	8,7	4,9	13,0	8,8	4,2	12,0	7,7	4,3	-11,7	-11,6	-11,9
	21st RS Telêmaco Borba	22,9	13,0	10,1	20,5	10,7	10,0	17,1	9,7	7,5	-25,3	-25,3	-25,9
	Total	16,4	9,5	7,0	16,1	9,4	6,7	14,6	8,7	5,9	-11,2	-8,2	-15,4
West	7th RS Pato Branco	19,9	10,5	9,4	18,1	10,9	7,3	15,9	8,3	7,6	-20,0	-20,9	-19,1
	8th RS Francisco Beltrão	15,3	6,7	8,6	15,0	7,7	7,4	12,3	6,2	6,1	-19,4	-7,4	-29,0
	9th RS Foz do Iguaçu	15,4	7,6	7,8	12,2	6,7	5,6	14,2	8,4	5,9	-7,6	10,6	-25,2
	10th RS Cascavel	14,2	8,4	5,9	13,0	6,9	6,2	12,7	7,5	5,2	-10,5	-10,3	-10,9
	20th RS Toledo	15,2	8,5	6,7	16,1	8,9	7,3	14,0	7,5	6,5	-7,9	-1v2,1	-2,6
	Total	15,7	8,2	7,5	14,5	7,9	6,6	13,7	7,6	6,1	-12,7	-7,7	-18,3
Northwest	11th RS Campo Mourão	16,9	9,1	7,8	16,6	10,0	6,7	16,2	9,1	7,1	-3,9	0,0	-8,5
	12th RS Umuarama	17,3	10,0	7,4	14,9	8,8	6,2	13,5	7,3	6,2	-22,1	-26,7	-16,2
	13th RS Cianorte	17,9	9,7	8,3	15,3	7,7	7,6	15,8	9,6	6,3	-11,6	-0,6	-24,6
	14th RS Paranavaí	20,3	10,6	9,8	17,2	11,0	6,3	14,9	8,6	6,3	-26,7	-18,8	-35,5
	15th RS Maringá	14,8	8,8	6,1	13,0	7,9	5,1	13,9	7,9	6,0	-6,6	-10,0	-1,7
	Total	16,7	9,4	7,4	14,8	8,9	6,0	14,6	8,3	6,3	-13,0	-11,7	-14,7
North	16th RS Apucarana	15,2	7,1	8,1	15,1	9,3	5,9	13,9	7,9	6,1	-8,6	10,2	-25,3
	17th RS Londrina	13,7	7,2	6,6	12,4	7,0	5,5	12,0	6,7	5,3	-12,4	-6,5	-19,0
	18th RS Cornélio Procopio	18,1	9,5	8,7	20,7	10,7	10,0	17,8	11,5	6,4	-1,6	20,8	-26,4
	19th RS Jacarezinho	20,8	13,5	7,4	21,9	14,6	7,4	17,2	11,5	5,8	-17,3	-14,8	-22,0
	22th RS Ivaiporã	17,3	9,3	8,0	13,5	7,5	6,1	14,7	9,8	4,9	-15,0	4,9	-38,4
	Total	15,9	8,6	7,4	15,4	9,1	6,4	14,0	8,4	5,6	-12,2	-2,6	-23,6
	Paraná	16,2	9,1	7,2	15,5	9,0	6,5	14,3	8,4	5,9	-11,7	-7,7	-18,1

Source: Brazil⁽⁸⁾.

Subtitles:

MRS = Microregional

RS = Regional Health (*Regional de Saúde*)

PMR = Perinatal Mortality Rate

FMR = Fetal Mortality Rate

ENMR = Early Neonatal Mortality Rate