

Main preventable causes of deaths in the neonatal period between 2016 and 2021



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ABSTRACT

The study of the causes of deaths in the neonatal period in a country is very relevant to social reality, as well as to analyze the quality of life, availability of health services for the population and its development. Therefore, the objective of this study is to analyze the preventable causes of neonatal mortality in Brazil from 2016-2021. This is a retrospective time series epidemiological study carried out with the early neonatal, late neonatal and post-neonatal mortality rates of the entire Brazilian territory between the years 2016 and 2021 through the Mortality Information System of the IT Department of the Unified Health System. It is noted that in the period between 2016 and 2021 there were 137,751 deaths from preventable causes in the age group of 0-364 days, corresponding to a rate of 8.11 for every thousand live births. Therefore, the main causes were adequate care for women during pregnancy (n=57,219, 41.53%), adequate care for newborns (n=37,128, 26.95%) and care for women during childbirth (n= 20,621, 14.97%). Early neonatal mortality (0-6 days) had a rate of 4.84 deaths per thousand live births (n=82,154), corresponding to 59% of deaths in children under 1 year of age. Furthermore, late neonatal mortality (7-27 days) had a rate of 1.52 deaths per thousand live births (n=25,763). As well as post-neonatal mortality (28-364 days) of 1.76 deaths per thousand live births (n=29,834). It is concluded that there was a decline in the neonatal mortality rate from preventable causes from 2016 to 2021, with the age group 0-6 days being the highest. The lack of attention to women during the gestational period stands out, followed by the lack of attention to the newborn.

Keywords: Causes of death, Infant mortality, Vital statistics, Neonatal mortality, Health information systems.

1 INTRODUCTION

"Avoidable deaths" is a concept that corroborates the monitoring of health actions regarding



the risks of death of populations, reviewed by Malta & Duarte, this concept is brought by several authors in the literature¹. The study of causes of death in the neonatal period in a country is very relevant to the social reality, since the infant mortality rate is essential to analyze the quality of life, the availability of health services for the population, as well as their development². Therefore, the number of neonatal deaths in the 2016-2021 period was approximately 138 thousand deaths from preventable causes in the age group of 0-364 days, corresponding to a mortality rate of 81.1 deaths for every ten thousand live births (LB).

In recent years, through a universal comparison, neonatal deaths have decreased significantly, especially in the post-neonatal component. However, there was a small reduction in neonatal deaths in developing countries, such as Brazil. However, when comparing deaths in the Brazilian interregions, there is a significant difference between them, given that the North and Northeast regions have high neonatal mortality rates in relation to the South and Southeast regions. In this sense, most neonatal deaths occur in the early neonatal period, from birth to the 6th day of life, and about a quarter of deaths occur on the first day of life, evidencing the close relationship between infant deaths and labor and birth care, which is predominantly hospital care in Brazil, with few exceptions in some locations³.

Therefore, despite the large and valuable scientific production on the subject presented at a global level, in Brazil, this production is still not satisfactory. Considering this scenario, with the national context of the Unified Health System (SUS) as its fulcrum, it is extremely necessary to systematize its contextualization, as well as a more detailed review of the lists of causes of avoidable deaths. Thus, the relevance of deepening the

This study would be essential for the implementation of mechanisms for monitoring performance at the level of complexity of health care and prevention, thus directing the actions of public health policies, as well as substantiating academic studies with a satisfactory level of comparability¹. Thus, the objective of this study is to analyze the avoidable causes of death in the neonatal period in Brazil, since factors related to the avoidability of infant mortality have been little described in the current literature⁴.

Thus, this study aimed to analyze the preventable causes of neonatal mortality in Brazil from 2016 to 2021.

2 METHODOLOGY

This is a retrospective time-series epidemiological study that included the early neonatal mortality rate (0-6 days), late neonatal mortality rate (7-27 days), and post-neonatal mortality rate (28-364 days) for the entire Brazilian territory between 2016 and 2021. Data were obtained from the Mortality Information System (SIM) of the Department of Informatics of the Unified Health System (DATASUS Tabnet) of the Ministry of Health (MS). Avoidable causes of death in Brazilian children



aged 0 to 364 days and mortality in this group were evaluated.

Microsoft Excel 2019 software was used to tabulate data according to the early, late, and post-neonatal mortality rate, through calculations and structuring of tables and graphs. The data collected were arranged according to the avoidable causes of death: reducible by immunization actions, care for women during pregnancy, care for women in childbirth, and newborns, avoidable through appropriate diagnostic and therapeutic actions, in addition to promotion actions linked to care actions. It is worth noting that the present study was based on public and anonymous data, so it was not necessary to submit it to the Research Ethics Committee (REC) in accordance with Resolution No. 510, of April 7, 2016.

3 RESULTS

In the 2016-2021 period, there were 137,751 deaths from preventable causes in the age group of 0-364 days, corresponding to a mortality rate of 8.11 per thousand live births. Thus, breaking down the causes of death, the ones that stood out the most were those preventable by adequate care for women during pregnancy (n=57,219, corresponding to 41.53% of the total), adequate care for newborns (n=37,128, 26.95%) and care for women during childbirth (n=20,621, 14.97%).

In addition to the above-mentioned causes, there are also preventable causes through the improvement of diagnostic and treatment actions (n=12,330, 8.95%), promotion of bonding and care actions (n=10,321, 7.50%) and immunization (n=132, 0.1%).

Table 1: Preventable deaths in neonatal periods (in total numbers and rate per 1000 live births) according to their causes between the years 2016 and 2021.

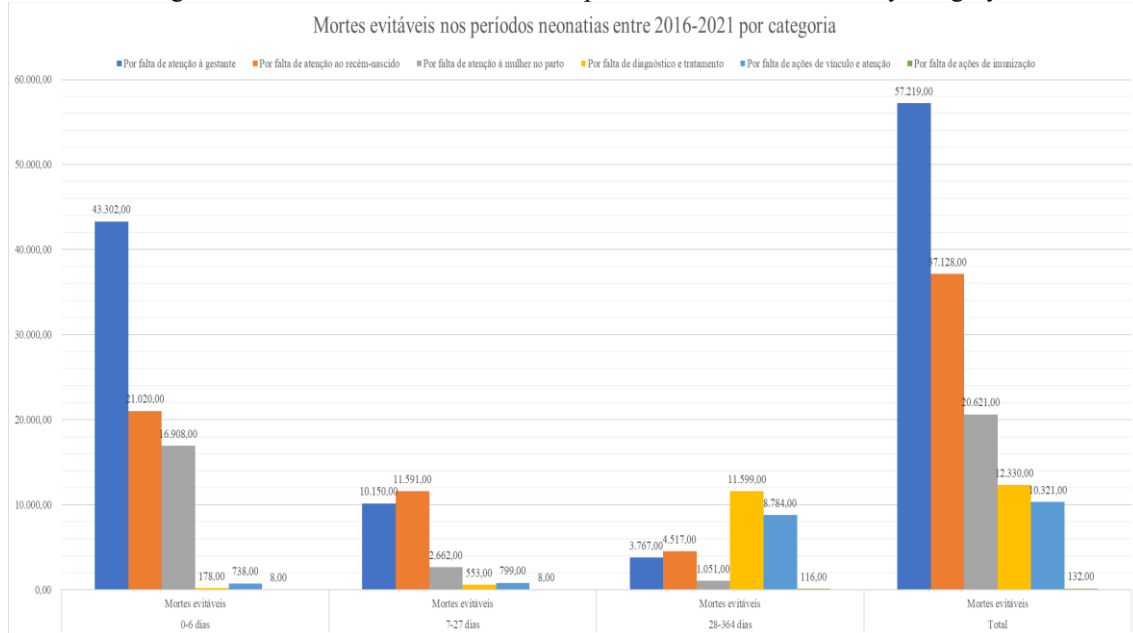
Cause	0-6 days		7-27 days		28-364 days		Total	
	Preventable deaths	Rate per 10 ³	Preventable deaths	Rate per 10 ³	Preventable deaths	Rate per 10 ³	Preventable deaths	Rate per 10 ³
Due to lack of attention to the Pregnant	43.302,00	2,55	10.150,00	0,60	3.767,00	0,22	57.219,00	3,37
Due to lack of attention to the newborn born	21.020,00	1,24	11.591,00	0,68	4.517,00	0,27	37.128,00	2,19
Due to the lack of attention to women in the parto	16.908,00	1,00	2.662,00	0,16	1.051,00	0,06	20.621,00	1,21
Due to lack of diagnosis and treatment	178,00	0,01	553,00	0,03	11.599,00	0,68	12.330,00	0,73
Due to the lack of bonding actions and attention	738,00	0,04	799,00	0,05	8.784,00	0,52	10.321,00	0,61



Due to lack of immunization actions	8,00	0,00	8,00	0,00	116,00	0,01	132,00	0,01
Total	82.154,00	4,84	25.763,00	1,52	29.834,00	1,76	137.751,00	8,11

Source: YES – DATASUS

Figure 1: Preventable deaths in neonatal periods from 2016 to 2021 by category



Source: YES - DATASUS

Assessing the early neonatal mortality rate (0-6 days), a rate of 4.84 deaths per thousand live births (n=82,154) was observed, corresponding to 59.6% of deaths in children under 1 year of age. Potentially preventable causes through care for women during pregnancy led the ranking with 43,302 deaths (52.71%), this data was observed mainly at the expense of the respiratory distress syndrome of the newborn (n = 9,112) and other involvement of the fetus and newborn by maternal conditions (n = 10,029). The second most common preventable cause of mortality in this age group is due to lack of attention to newborns (n = 21,020), especially perinatal and neonatal infections – discounting Congenital Rubella Syndrome (CRS) and congenital viral hepatitis – (n = 9,329) and cardiovascular respiratory disorders specific to the neonatal period (n = 7,320). In third place, there were deaths resulting from inadequate care for women during childbirth with a total of 16,908 (20.58%), followed by preventable causes through bonding and care actions with a total of 738 (0.89%), deaths reducible by diagnostic actions and adequate treatment with 178 (0.22%) and preventable deaths through immunization corresponding to the value of 8 deaths (0.01%).

On the other hand, when analyzing the main avoidable factors of death between 7 and 27 days (late neonatal mortality), the causes derived from the lack of care for the newborn lead with 11,591 deaths (45%). In this scenario, it is worth highlighting the prevalence of neonatal infections (7,634) and respiratory and cardiovascular disorders (1,598). In second place, there are deaths that occurred



due to lack of care for women during the gestational period (n = 10,150), corresponding to 39.40%, but in addition to the causes mentioned above in the previous paragraph – Respiratory distress syndrome of the newborn (n = 1,366) and other affects of the fetus and newborn due to maternal conditions (n = 2,973) – the data on fetuses and newborns affected by maternal factors and pregnancy complications are also highlighted. labor and delivery (n = 1,335). In addition, there are deaths avoidable by adequate care for women in childbirth (10.33%), actions to promote bonding and care actions (3.10%), diagnostic actions and adequate treatment (2.15%) and, finally, deaths avoidable through immunization (0.031%).

Table 2: Number of preventable deaths in neonatal periods in each year from 2016 to 2021

Year of Death	0 to 6 days	7 to 27 days	28 to 364 days	Total
2016	14.327	4.425	5.616	24.368
2017	14.652	4.480	5.295	24.427
2018	14.185	4.491	5.224	23.900
2019	13.672	4.323	5.267	23.262
2020	12.762	3.973	4.012	20.747
2021	12.556	4.071	4.420	21.047
2016-2021	82.154	25.763	29.834	137.751

Source: YES - DATASUS

Unlike the age group from 0 to 27 days of life, the lack of attention to women during pregnancy and the lack of attention to newborns are not among the main preventable causes of post-neonatal infant mortality (28-364 days), in this category there were 29,834 deaths. In this context, specifically, the causes of lack of diagnostic actions and adequate treatment stand out, with 11,599 deaths (38.88%) and bonding and care actions, corresponding to 8,784 deaths (29.44%). Among deaths resulting from diagnostic actions and poor treatment, pneumonia is the most prevalent cause (n = 4,481), followed by other bacterial diseases (3,297). On the other hand, the lack of bonding and attention actions is mainly due to accidental risks to breathing (n = 3,102) and intestinal infectious diseases (n = 2,097). Regarding deaths related to newborn care, 4,517 (15.14%) were observed, followed by ineffective care for women during pregnancy, with 3,767 deaths (12.2), care for women in childbirth with 1,051 (3.52%) and, in last place, preventable causes through immunization were observed, with 116 deaths (0.39%).

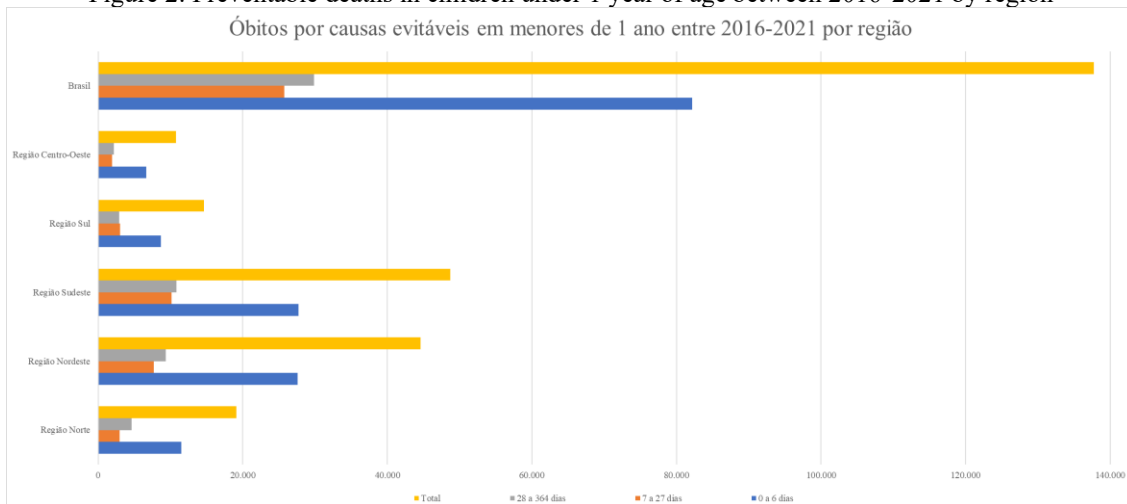
Table 3: Number of preventable deaths by Brazilian Region from 2016 to 2021

Area	0 to 6 days	7 to 27 days	28 to 364 days	Total
North Region	11.486	2.982	4.633	19.101
Northeast Region	27.597	7.677	9.331	44.605
Southeast Region	27.723	10.135	10.827	48.685
South Region	8.685	3.028	2.898	14.611
Midwest Region	6.663	1.941	2.145	10.749
Brazil	82.154	25.763	29.834	137.751

Source: YES – DATASUS



Figure 2: Preventable deaths in children under 1 year of age between 2016-2021 by region



Source: YES - DATASUS

4 DISCUSSION

The research revealed that infant mortality from preventable deaths has been decreasing in Brazil from 2016 to 2021.

The age group of newborns (NBs) between 0 and 6 days of life accounted for 82,154 deaths (59.6%), with the main causes being care for women during pregnancy and adequate care for newborns. According to BERNARDINO, et. al (2022) it is possible to identify that in the period from 2007 to 2017, care for women during pregnancy also stood out as the main cause of avoidable deaths in newborns with early death (0-6 days of life). Also, in PREZOTTO, et. al (2023) it is described that the Northeast region had the highest rate of preventable early neonatal mortality in the period from 2000 to 2018, different from the period from 2016 to 2021, which was addressed in this study, which shows the Southeast region with the highest rates.

The number of late neonatal deaths (7-27 days of life) was mainly caused by the lack of adequate care for newborns, representing 11,591 (44.99%) of late neonatal deaths. The main region was the Southeast and the second was the Northeast. In PREZOTTO, et. al (2023) the North region was evidenced as the main one in late neonatal deaths in previous years, but with the same preventable cause in evidence.

In the neonatal period (0-27 days of life) it was possible to trace that among the causes that are reducible to care for women during pregnancy and reducible adequate care for newborns, the comorbidities that most prevalent were maternal conditions that affected the fetus and newborns, respiratory distress syndrome of newborns, per neonatal infection, except CRS and congenital viral hepatitis, and cardiovascular respiratory disorder specific to the neonatal period.

The quantitative analysis of premature and late mortality rates emerges as an indicator of great relevance to understand the complexity of a nation's social reality. This approach allows the revelation of several aspects, such as socioeconomic status, the quality of health care services and the



effectiveness of public policies in force, establishing an inverse relationship with the degree of human development. Promoted by the United Nations, the Sustainable Development Goals (SDGs) have as one of their goals for 2030 to reduce neonatal mortality to at least 12 per 1,000 live births and the mortality of children under 5 years of age to at least 25 per 1,000 live births⁵. Thus, Brazil is within the values established by the SDG, with an index of 8.11 for every thousand live births due to preventable causes.

The results show that infant mortality from preventable causes continues to be a challenge for Brazilian health. Even with the decrease in this rate, the way in which primary care can help prevent these deaths is notorious. The importance of immunization, prenatal care, and early treatment of treatable diseases in pregnant women would prevent more deaths. Adequacy, commitment and grounding in scientific evidence are fundamental elements for professionals and institutions to promote a transformation in the care model directed to pregnant women, newborns and their families.

Therefore, it is necessary to take into account that some municipalities use means that are not possible to account for the system, due to lack of internet and computers, so some deaths may not be registered, since the data were taken from the Mortality Information System (SIM) of the Department of Informatics of the Unified Health System (DATASUS) of the Ministry of Health (MS).

5 CONCLUSION

Based on the results obtained by the study, it is concluded that there was a decline in the neonatal mortality rate from preventable causes in the period from 2016 to 2021. Comparing the different age groups, it is observed that the rate of early neonatal deaths is still higher when compared to late deaths and continues to be a challenge for Brazilian health.

In this scenario, the lack of attention to women during pregnancy stands out, followed by the lack of attention to newborns (NB), as the main avoidable causes of early neonatal death (0-6 days of life). Late neonatal deaths (7-27 days of life) are the main reducible cause of care for the newborn, and then for the pregnant woman, especially in the Southeast and Northeast regions. Finally, in the age group of 0-27 days of life, the lack of bonding and care actions, in addition to the deficit of diagnostic actions and adequate treatment, especially in relation to pneumonia, stood out as relevant causes.

Even though this study revealed a reduction in neonatal death rates, there is still an extreme need to develop and implement government strategies for public health, aiming to control infant mortality rates in Brazil, with a focus mainly on preventable causes.



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