ORIGINAL ARTICLE

Risk factors for neonatal death in the capital city with the lowest infant mortality rate in Brazil

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Abstract

Objectives: To analyze the risk factors for neonatal death in Florianópolis, the Brazilian city capital with the lowest infant mortality rate.
Method: Data were extracted from a historical cohort with 15,879 live births. A model was used that included socioeconomic, behavioral, and health service use risk factors, as well as the Apgar score and biological factors. Risk factors were analyzed by hierarchical logistic regression.
Results: Based on the multivariate analysis, socioeconomic factors showed no association with death. Insufficient prenatal consultations showed an OR of 3.25 (95% CI: 1.70–6.48) for death. Low birth weight (OR 8.42; 95% CI: 3.45–21.93); prematurity (OR 5.40; 95% CI: 2.22–13.88); malformations (OR 4.42; 95% CI: 1.37–12.43); and low Apgar score at the first (OR 6.65; 95% CI: 3.36–12.94) and at the fifth (OR 19.78; 95% CI: 9.12–44.50) minutes, were associated with death.
Conclusion: Differing from other studies, socioeconomic conditions were not associated with neonatal death. Insufficient prenatal consultations, low Apgar score, prematurity, low birth weight, and malformations showed an association, reinforcing the importance of prenatal access universalization and its integration with medium and high-complexity neonatal care services.

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Introduction

The infant mortality rate is used to assess the quality of life of a population and the health care of their children. Infant deaths are associated with a wide range of socioeconomic, behavioral, and biological risk factors.\textsuperscript{1-4} To evaluate these factors in an integrated way, in 1984 Mosley and Chen\textsuperscript{3} proposed a hierarchical model based on the hypothesis that socioeconomic factors determine behaviors, which, in turn, have an impact on a set of biological factors. According to their model, biological factors are those directly responsible for death. The hierarchical model brings a great advance to the development of public policies, since information coming from studies that are limited to only a group of risk factors result in inadequate recommendations to assess the deaths among children, as they present a limited vision of the phenomenon.\textsuperscript{5} For instance, studies that encompass only behavioral risk factors can make it difficult to contextualize these behaviors. Thus, when addressing the low demand for prenatal consultations or vaccines, it is crucial to understand the socioeconomic conditions of the studied individuals, being clear that actions directed at a population with high level of schooling and easy access to health services should be different from those directed at individuals with a low educational level and few available health services.

Infant mortality has shown a substantial decrease worldwide, which has been attributed to progress in social and environmental conditions and health services observed in recent years.\textsuperscript{1,4} This decrease has been mainly due to the decrease in its post-neonatal component.\textsuperscript{5,6} Neonatal deaths, however, have not responded in the same way to the abovementioned improvements, and still present a great challenge for developing nations, such as Brazil.\textsuperscript{1,4}

In Brazil, since the enactment of the Federal Constitution of 1988, a large part of the burden of coping with neonatal mortality has been imposed on municipalities, which have taken on a prominent position in the implementation of public health policies.\textsuperscript{7,8}

Florianópolis, the capital city of the state of Santa Catarina, located in southern Brazil, has the highest Municipal Human Development Index (HDI-M) among all Brazilian capitals.\textsuperscript{9} The municipality, with 477,798 inhabitants,\textsuperscript{10} also has the lowest infant mortality rate,\textsuperscript{9} which was 5.34 per 1000 live births in 2016.\textsuperscript{11}

Information produced in this context and using a model that integrates risk factors with a hierarchical model can help to achieve a broad comprehension of the phenomenon. This is crucial to develop public policies by the municipality itself and by other Brazilian cities, in the scenario of administrative and tax decentralization experienced by the country.\textsuperscript{12} Moreover, it can also provide information to policies in cities located in other developing countries, and to the states and the Brazilian federal setting, contributing to the prevention of infant deaths in the neonatal period. Thus, the present study aimed to analyze the risk factors for neonatal death in the capital city of Santa Catarina.

Methods

Area and study population

The study was carried out based on a historical cohort of live births, developed as part of the epidemiological surveillance activities of the Municipal Health Secretariat in 2016. It was carried out through the data analysis of children born in the municipality between 01/01/2012 and 12/31/2014, extracted from the Live Births Information System (Sistema
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