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TEMPORAL EVOLUTION OF MORTALITY FROM CARDIOVASCULAR RHEUMATIC DISEASE IN SOUTHERN BRAZIL

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Abstract: Introduction: Rheumatic disease is one of the leading causes of cardiovascular mortality in underdeveloped and developing countries. Improvements in primary health care and access to cardiology services have enabled many patients with rheumatic fever to avoid developing long-term cardiovascular sequelae, receiving specialized follow-up and undergoing early interventions when necessary. **Objective:** To describe the temporal evolution of deaths from cardiovascular disease in rheumatic diseases in southern Brazil from 2004 to 2023. **Methodology:** This is an ecological study with data collected from the DATASUS platform of the Ministry of Health on deaths from cardiovascular disease caused by rheumatic diseases that occurred in the South region of Brazil from 2004 to 2023, evaluated by year of occurrence, state, sex, and age group. **Results:** CRD claimed 4,987 lives in the period analyzed, with 55% of these deaths occurring between 2004 and 2013. The state of Paraná accounted for the absolute majority in the two decades evaluated, followed by Rio Grande do Sul and Santa Catarina. In both decades, Paraná was the state with the most deaths, followed by Rio Grande do Sul and Santa Catarina, respectively. A linear downward trend was observed in the number of deaths in Paraná, while in the states of Santa Catarina and Rio Grande do Sul there was an upward trend in the number of deaths from 2004 to 2023. Women accounted for 62.5% of the total number of victims in the period, being the most affected gender in all three states. In PR, there was a reduction in female mortality, which was not found in RS and SC. Regarding men, there was a reduction in deaths in the states of PR and SC, while in RS there was an increase between the decades. The age group with the highest number of deaths was 60-69 years, followed by 50-59 years and the population over 80 years. In PR and SC, the most affected age group was 60-69 years, while in

RS it was 70-79 years. Females were the most affected in all age groups evaluated, with a 10% reduction in deaths among women over 80 years of age from 2013-2024 compared to 2004-2013, and a 23.6% increase in deaths among men over 80 years of age in the same period. **Conclusions:** It was observed that the first decade analyzed had the highest number of deaths from DCR. In both decades, the state of Paraná accounted for the absolute majority of deaths, followed by Rio Grande do Sul and then Santa Catarina. In Paraná, there was a downward trend in the number of deaths over the years, which was not found in Santa Catarina and Rio Grande do Sul. In both decades, states, and age groups, women were the majority of CRD victims. The population over 60 years of age was the most affected in both states, sexes, and decades. In the state of PR, there was a significant reduction in the percentage of deaths in all age groups, which did not occur in SC and PR.
Keywords: Cardiology; Rheumatic heart disease; Epidemiology; Rheumatic fever; Mortality.

INTRODUCTION

Acute rheumatic fever (ARF) occurs as an autoimmune inflammatory response to pharyngitis caused by *Streptococcus pyogenes*, a group A beta-hemolytic bacterium, which occurs about two weeks after infection and is most common in childhood or early adolescence. ARF can be self-limiting or cause cardiac involvement—rheumatic carditis—and other organs and systems, such as the skin, kidneys, and nervous system. Rheumatic heart disease (RHD), also known as rheumatic heart disease, has different clinical and prognostic manifestations from the acute condition and is the leading cause of morbidity and mortality associated with the disease. (Gewitz et al., 2015)

RF can affect the endocardium, myocardium, or pericardium during the acute episode—rheumatic carditis—which occurs in 50-70% of cases of pharyngitis caused by *Streptococcus pyogenes*. Some of these patients may not present cardiovascular symptoms or signs on physical examination, with changes detected only by complementary diagnostic methods, such as transthoracic echocardiography and, in some cases, transesophageal echocardiography alone.

However, the cardiac structures most affected, both in the acute and chronic settings, are the heart valves, especially those on the left side, the mitral valve, and the aortic valve. Acute valve involvement manifests predominantly as insufficiency due to inflammation and edema of the valve leaflets, mitral annular dilatation, and chordal elongation, which is more common in the mitral valve. Resolution of the inflammatory condition and appropriate clinical management allow most patients with AHF to remain asymptomatic from a cardiovascular standpoint after streptococcal infection (Kumar et al., 2020).

However, with the recurrence of AHF episodes or the progression of the acute inflammatory process, progressive fibrosis of the valves occurs, leading to commissural fusion, thickening, and calcification of the leaflets, culminating in valve stenosis, especially mitral stenosis, which is the most classic finding of rheumatic heart disease (Marianna Fabi et al., 2019).

The clinical findings in patients with CRD may include the appearance of signs and symptoms related to mitral valve stenosis, such as signs of left atrial overload on electrocardiogram and atrial fibrillation (AF) due to enlargement of this chamber. The presence of arrhythmias, the most frequent being AF, is common in this group of patients, and when associated with moderate to severe mitral valve disease, it is called valvular AF, which sig-

nificantly increases the risk of thromboembolic events. Signs and symptoms of pulmonary hypertension may also be found in these patients (Dougherty et al., 2022; Sika-Paotonu et al., 2016).

In addition, RF is still one of the main etiologies of heart failure (HF) in Brazil. Patients diagnosed with rheumatic heart disease after the onset of HF symptoms have a worse prognosis and should be managed according to HF treatment recommendations. (Rohde et al., 2018).

METHOD

This is an ecological study conducted with data collected from the TABNET platform of the Department of Informatics of the Unified Health System (DATASUS) made available by the Brazilian Ministry of Health. Deaths were filtered according to the following conditions based on the International Classification of Diseases, 10th edition (ICD-10): I01 Rheumatic fever with heart involvement; I05 Rheumatic diseases of the mitral valve; I06 Rheumatic diseases of the aortic valve; I07 Rheumatic diseases of the tricuspid valve; I09 Other rheumatic diseases of the heart. Deaths that occurred in the states of the Southern Region: Paraná (PR), Santa Catarina (SC), and Rio Grande do Sul (RS) between 2004 and 2023 were selected.

The variables analyzed were: federal unit, year of death, sex, and age group. The data were tabulated in Excel and analyzed using descriptive statistics. For a better assessment of the temporal evolution, given that this is a long period, some temporal analyses were divided into the first decade (2001-2013) and the second decade (2014-2023). The data were collected on July 30 and 31, 2025.

As this is a study based on a database, it was not necessary to submit it to a research ethics committee. The authors declare that they have no conflicts of interest.

RESULTS

During the period analyzed, a total of 4,987 deaths related to rheumatic diseases were observed in the southern region of Brazil. In the first decade analyzed, 2004-2013, 2,755 deaths were recorded, and in the second decade, 2014-2023, there were 2,232 deaths. Thus, the first decade accounted for 55% of deaths from CRD between 2004 and 2023.

The state of Paraná accounted for the absolute majority of cases, with 2,577 (51.7%), followed by the state of Rio Grande do Sul with 1,329 deaths (26.7%) and Santa Catarina with 1,081 cases (21.7%). In both decades, Paraná was the state with the highest number of victims, followed by Rio Grande do Sul and finally Santa Catarina. PR accounted for 55.4% of deaths in the first decade and 47% in the second. RS accounted for 23.8% between 2004 and 2013 and 30.1% in the second half. The state of SC accounted for 20.7% of deaths in the first decade and 22.8% in the second decade.

In the state of Paraná, there was a linear downward trend in the number of deaths over the years evaluated (Figure 2). Between 2004 and 2023, there was a 32.9% reduction in the total number of deaths. In SC, the number of deaths from rheumatic diseases remained stable over the years, with a 10% increase between the years at the extremes, and in RS, a linear upward trend was observed, despite a 12% reduction in the number of deaths from rheumatic diseases when comparing 2004 and 2023 (Figures 3 and 4).

In terms of gender, women accounted for 3,119 deaths, corresponding to 62.5% of the total, compared to 1,868 deaths among men (37.5%).

Women accounted for the majority of deaths in all three states. In PR, they accounted for 63.5% of total deaths, in SC for 57.8%, and in RS for 64.5%. In the analysis between decades, from 2004 to 2013, women accounted for 62.3% of total deaths, and between 2014

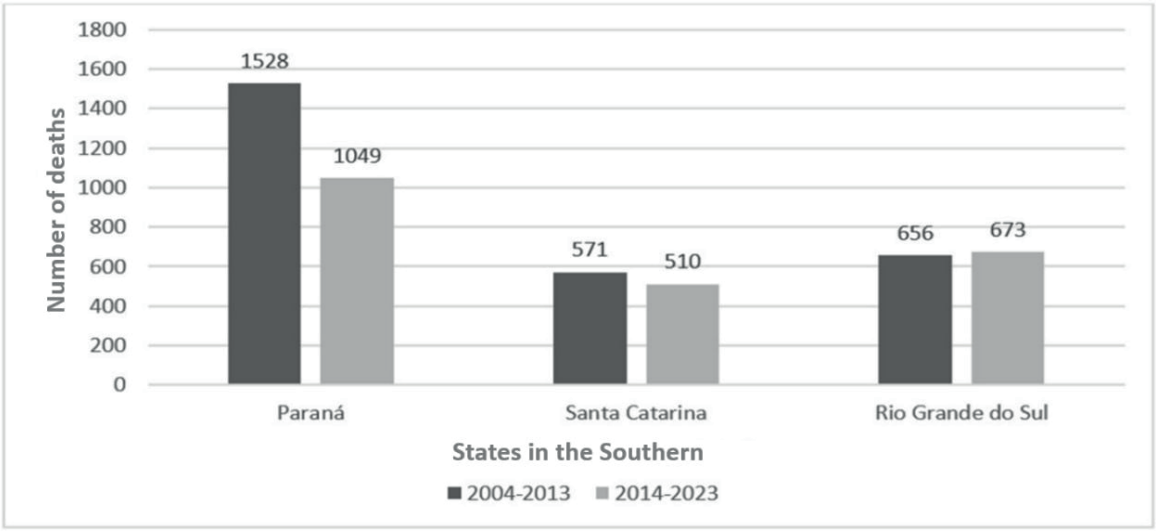

Figure 1. Number of deaths from rheumatic diseases by decade in the states of the Southern Region.

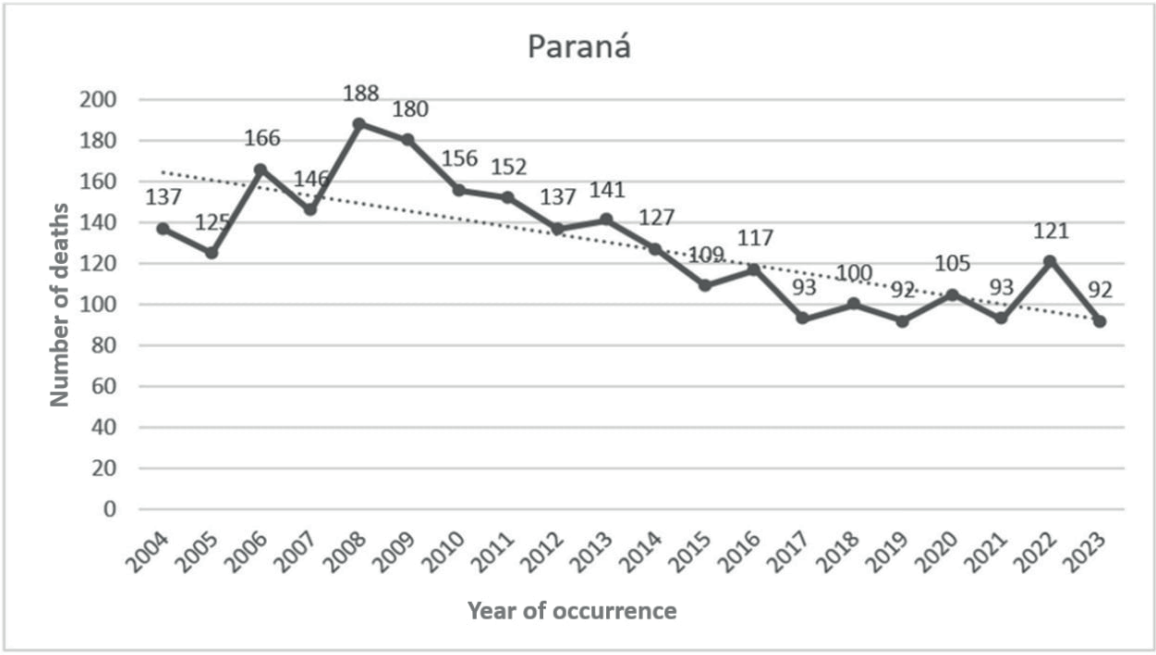

Figure 2. Number of deaths each year in the state of Paraná. Dotted line indicates linear trend.

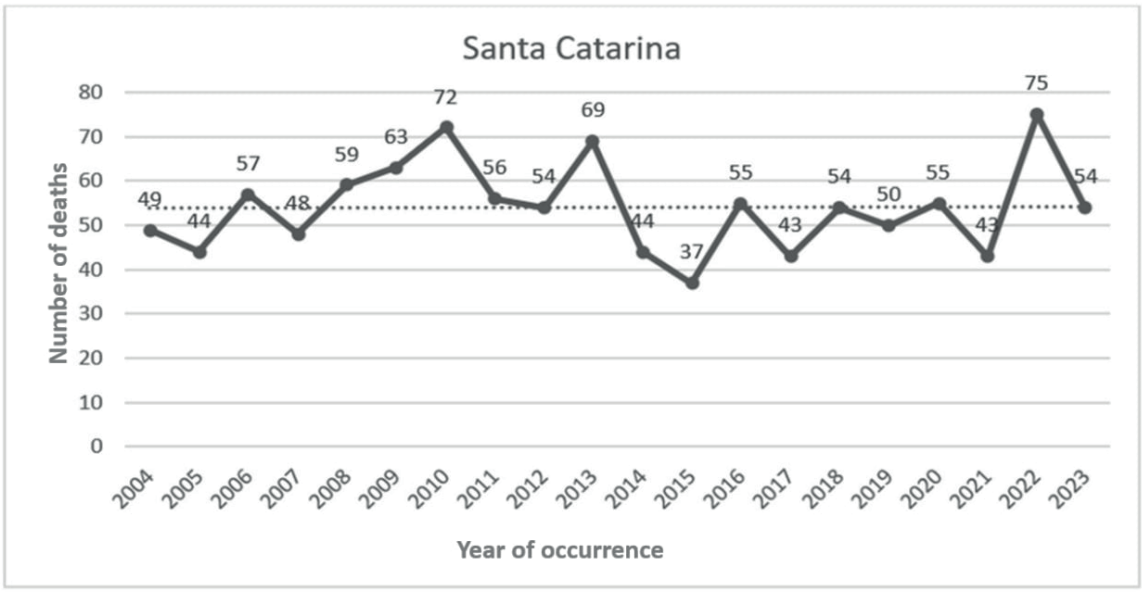

Figure 3. Number of deaths each year in the state of SC. Dotted line indicates linear trend.

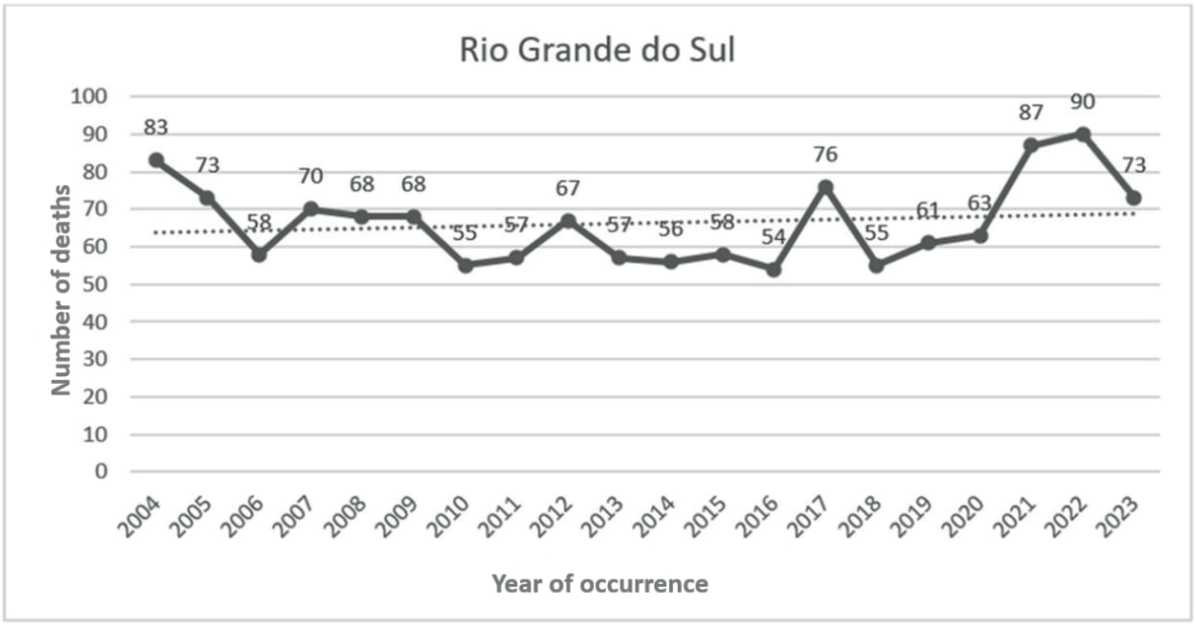

Figure 4. Number of deaths each year in the state of RS. Dotted line indicates linear trend.

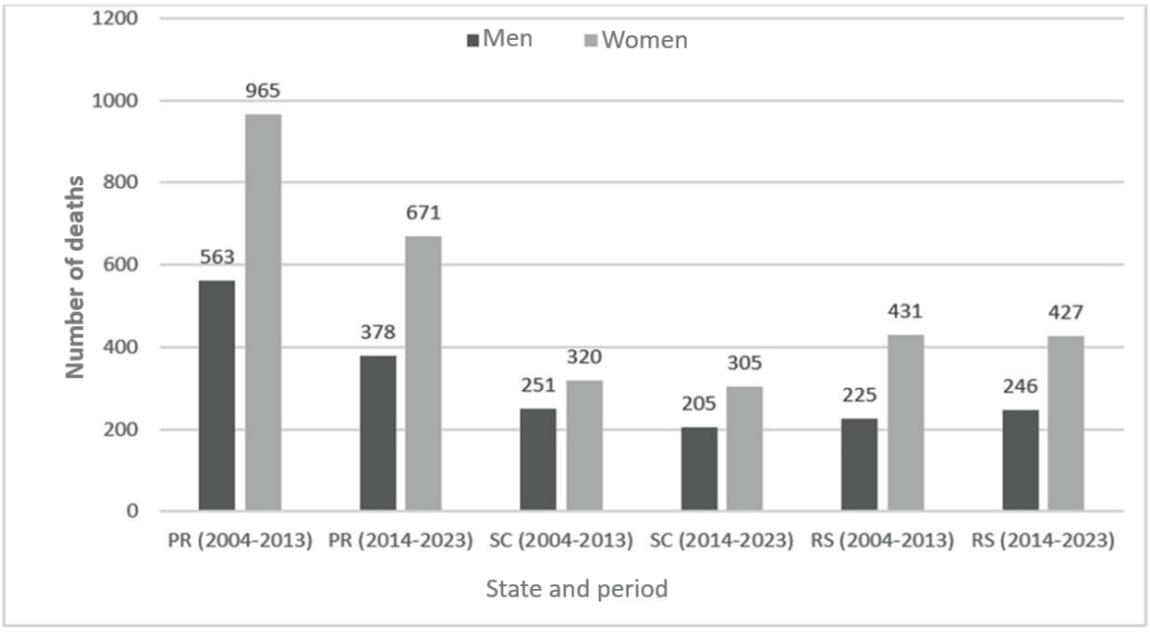

Figure 5. Number of deaths by sex, state, and decade evaluated.

and 2023, 62.9%. There was a slight variation in the percentage of female victims of DCR when evaluating the temporal variation in decades in RS and SC, while in PR there was a 30% decline in female mortality. However, in each state of the Southern Region, the pattern of female predominance in deaths remained consistent over the two decades.

In the state of PR, there was a decline in male mortality, which was even more significant than in women, at 32.9% between the two decades. In SC, this variation was a 18.3% reduction, and in RS, there was an increase in the percentage of deaths among men of 9.3%. (Figure 5).

The age group most affected by DCR between 2004 and 2023 was the population aged 60-69, with 1,210 deaths (24.3%), followed by the population aged 50-59, with 999 victims (20%), and those over 80, with 634 cases (12.7%). The predominance of deaths in the 60-69 age group was evident in PR and SC, while in RS there was a higher concentration of deaths in people aged 70-79, a finding that was repeated in both decades and in the total number of deaths.

The population aged 40-49 years had the largest reduction in mortality rates between the decades, from 64.6%, due to a 75% reduction in the percentage of deaths in this age group in PR. The second age group with the largest percentage reduction in deaths was 50-59 years (47%), followed by the 70-79 age group (41%), both influenced by the largest percentage reduction and absolute majority of deaths in the state of PR.

In the states of SC and RS, there was an increase in the number of deaths in the age groups above 60 years and a decrease in the younger age groups when comparing the first decade (2004-2013) with the second (2014-2023). In PR, there was a reduction in the number of deaths in all age groups evaluated when comparing the two decades, as shown in Table 1 and Table 2.

	40-49	50-59	60-69	70-79	8gt; 80 YEARS
PR	420	572	594	559	289
SC	76	116	136	118	69
RS	78	125	132	150	109

Table 1. Number of deaths by age group in the states of the Southern Region from 2004 to 2013.

	40-49	50-59	60-69	70-79	8gt; 80 YEARS
PR	106	231	308	213	107
SC	44	96	141	122	89
RS	53	100	167	173	149

Table 2. Number of deaths by age group in the states of the Southern Region from 2014 to 2023.

In all age groups evaluated, women accounted for the majority of deaths in both decades. The age group with the highest prevalence of female deaths was the population over 80 years of age (68%). It was also observed that the age group over 80 years old had the largest reduction in the percentage of female deaths between the two decades, at 10%, and was also the age group with the largest increase in deaths among men in the same period, at 23.6%.

CONCLUSIONS

During the period evaluated, 4,987 deaths from CRD were recorded in the southern region of Brazil. The first decade evaluated accounted for the absolute majority of these deaths (55%). The state of PR had the highest number of deaths in the region, representing 51.7% of the total, followed by RS with 26.7% and SC with 21.7% of the victims. In the state of Paraná, there was a linear downward trend in the number of deaths when evaluating the total number of deaths from 2004 to 2023, a finding that did not occur in Santa Catarina and Rio Grande do Sul.

Women were the most affected gender in the three states of the region and in all years evaluated. They accounted for 62.5% of total deaths. In the states of SC and RS, there was a small temporal variation in the percentage of female deaths, while in PR there was a 30% decline in the mortal . Males showed similar behavior, maintaining the percentage of deaths in SC and RS and showing a 32.9% drop in mortality in PR.

The age group with the highest number of deaths was 60-69 years, followed by 50-59 years and the population over 80 years. In PR and SC, the most affected age group was 60-69 years, while in RS, deaths occurred in older people, with a predominance of the 70-79 age group. In RS and SC, there was an increase in the number of deaths over 60 years of age between the decades evaluated, while in PR there was a decline in the number of deaths in all age groups.

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