

Premature mortality from chronic non-communicable diseases and coverage of primary care: analysis of indicators

Mortalidade prematura por doenças crônicas não transmissíveis e cobertura da atenção básica: análise dos indicadores

Mortalidad prematura por enfermedades crónicas no transmisibles y cobertura de atención: análisis de los indicadores

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Abstract: Objective: to evaluate the rate of premature mortality due to chronic noncommunicable diseases (CNCD) and its association with population Coverage of Primary Care teams in Santa Catarina municipalities. **Method:** cross-sectional study that used secondary data from the official state database. The indicators premature Mortality due to CNCD and population Coverage of Primary Care teams in the years 2017 and 2018 were collected in 2019. The data were analyzed in the Statistical Package for the Social Sciences version 25.0, for descriptive statistics and presented by mean and standard deviation. Spearman correlation test was used for the variables under study. **Results:** there was an increase in the rates of premature Mortality due to CNCD and a reduction in population Coverage of Primary Care teams, with no significant association between these indicators. **Conclusion:** the increase in premature mortality due to CNCD and the non-compliance with the agreed goals require evaluation of the actions performed in Primary Care.

Descriptors: Mortality, Premature; Noncommunicable Diseases; Primary Health Care; Family health; Health Promotion

Resumo: Objetivo: avaliar a taxa de mortalidade prematura por doenças crônicas não transmissíveis (DCNT) e sua associação com a Cobertura populacional pelas equipes de Atenção Básica nos municípios de Santa Catarina.

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Método: estudo transversal que utilizou dados secundários do banco de dados oficiais do Estado. Os indicadores Mortalidade prematura por DCNT e Cobertura populacional pelas equipes de Atenção Básica nos anos 2017 e 2018, foram coletados em 2019. Os dados foram analisados no *Statistical Package for the Social Sciences* versão 25.0, para estatística descritiva e apresentados por média e desvio padrão. Utilizou-se teste de correlação de *Spearman* para as variáveis em estudo. **Resultados:** houve aumento nas taxas de Mortalidade prematura por DCNT e redução na Cobertura populacional pelas equipes de Atenção Básica, sem associação significativa entre esses indicadores. **Conclusão:** o aumento da Mortalidade prematura por DCNT e o não cumprimento das metas pactuadas requerem avaliação das ações realizadas na Atenção Básica.

Descritores: Mortalidade Prematura; Doenças não Transmissíveis; Atenção Primária à Saúde; Saúde da Família; Promoção da Saúde

Resumen: Objetivo: evaluar la tasa de mortalidad prematura por enfermedades crónicas no transmisibles (ECNT) y su asociación con la Cobertura poblacional por parte de los equipos de atención primaria en los municipios de Santa Catarina. **Método:** estudio transversal que utilizó datos secundarios de la base de datos oficial del estado. Los indicadores Mortalidad prematura por ECNT y Cobertura poblacional por parte de los equipos de atención primaria en los años 2017 y 2018 se recogieron en 2019. Los datos fueron analizados en el *Statistical Package for the Social Sciences* versión 25.0, para estadística descriptiva y presentados por media y desviación estándar. La prueba de correlación de *Spearman* se utilizó para las variables en estudio. **Resultados:** hubo aumento en las tasas de mortalidad prematura debido a la ECNT y reducción en la Cobertura poblacional por parte de los equipos de atención primaria, sin una asociación significativa entre estos indicadores. **Conclusión:** el aumento de la Mortalidad prematura por ECNT y el incumplimiento de las metas acordadas requiere evaluación de las acciones realizadas en Atención Primaria.

Descriptorios: Mortalidad Prematura; Enfermedades no Transmisibles; Atención Primaria de Salud; Salud de la Familia; Promoción de la Salud

Introduction

Chronic Noncommunicable Diseases (CNCD) are a problem of global magnitude and are responsible for a decrease in quality of life, negative economic impacts for families, communities and society, and also, for a high number of deaths.¹ According to the World Health Organization (WHO), CNCD cause about 38 million deaths each year, and are responsible for 70% of deaths worldwide.² In Brazil, they account for 75% of the causes of death.^{1,3}

In developing countries, about one third of deaths from CNCD affect people under 60 years old, while in developed countries premature mortality (age group 30 to 69 years old) corresponds to less than 13% of cases.⁴ The rate of premature Mortality from all four major CNCD (circulatory system diseases, cancer, diabetes, and chronic respiratory diseases) is a health indicator used

worldwide to monitor one of the goals for health in Sustainable Development Goals (SDG). In Brazil, this indicator helps monitoring mortality from these causes, which are responsible for the highest number of deaths in the whole country. In addition, it is an important parameter for health services planning and agreement, at all levels of care, aimed at people with chronic diseases. This indicator is used for monitoring the quality of health care and well-being of the population from 30 to 69 years old since deaths up to this age are avoidable.⁵

In order to reduce and prevent the risks and health problems of the population, with a focus on the prevention of CNCD, the premature mortality rate is one of the indicators of interfederative agreement related to national health priorities.⁵ This indicator is also part of the Strategic Action Plan for Combating CNCD in Brazil for the period 2011 to 2022⁶, which is aligned with the Global Action Plan for the Prevention and Control of CNCD 2013-2020,⁷ of WHO. Overall, the plan foresees a 25% reduction in premature mortality from these causes by 2025. From this, Brazil has set a goal of reducing premature mortality by 2% per year.⁶

The literature indicates that one of the factors responsible for a reduction of about 20% in rates of mortality from CNCD is the expansion of Primary Care. In the last decade, greater coverage in this area has contributed to an improvement in Brazilians' health.⁸ In this context, population Coverage of Primary Care teams has been considered as healthcare organizer and structuring axis of programs and projects, being a fundamental indicator, which is also part of the agreement.⁵

The agreement aims to reinforce the responsibilities of each manager with the health needs of the population in the territory, in addition to strengthening the integration of planning instruments in the *Sistema Único de Saúde* (SUS).⁸⁻⁹ In this sense, health indicators are instruments for evaluating the performance of services actions. The information determined by the indicators provides the indispensable rationale for the evaluation of the actions carried out by the health system.⁹

There is evidence that appropriate action of Primary Care reduces deaths from CNCD.¹⁰⁻

¹¹ However, it remains a gap regarding the possible association between premature Mortality due to CNCD and population Coverage of Primary Care teams. In view of the above, the research question is: Is there an association between the rate of premature Mortality from CNCD and population Coverage of Primary Care teams in Santa Catarina municipalities? This study is based on the hypothesis that a lower rate of premature Mortality from CNCD is associated with greater population Coverage of Primary Care teams. Thus, the aim of this study was to evaluate the rate of premature Mortality from CNCD and its association with population coverage of Primary Care teams in Santa Catarina municipalities, Brazil.

Method

A cross-sectional ecological study based on secondary data from the interfederative agreement 2017 - 2021.⁵ The data were extracted from the official database of *Diretoria de Vigilância Epidemiológica do Estado de Santa Catarina* (DIVE/SC).¹² The period studied were the years 2017 and 2018, and all 295 Santa Catarina municipalities were studied.

The dependent variable was the rate of premature Mortality from CNCD. This indicator considers the number of premature deaths in a specific year and place recorded under the codes CID-10: I00-I99 (circulatory system diseases); C00-C97 (malignant neoplasms); J30-J98 except J36 (respiratory system diseases) and E10-E14 (Diabetes Mellitus). The numerator of the calculation method is the number of deaths (from 30 to 69 years old) from the diseases mentioned above, recorded in a specific year and place. The denominator is the resident population (from 30 to 69 years old) in a specific year and place. The multiplication factor is 100,000. Thus, the unit of measurement is expressed in the number of deaths per 100,000 inhabitants. It is used to monitor the impact of public policies on the prevention and control of these diseases and their risk factors.⁵

The independent variable was population Coverage rate of Primary Care teams. This indicator considers 3,450 individuals covered by Family Health teams, and 3,000 individuals covered by parameterized Primary Care and equivalent teams. The calculation method has as numerator: the number of Family Health teams x 3,450 + (number of parameterized Primary Care and equivalent teams) x 3,000 in a specific place and period. The denominator is the population estimate of the previous year. The multiplication factor is 100, so the unit of measure is expressed as a percentage. This rate is used to monitor the access and resolution capacity of Primary Care services, with a view to strengthening SUS planning according to the interfederative agreement 2017-2021.⁵

Data were collected in September 2019 and organized in a spreadsheet in Excel 2016® (Microsoft Office) with double typing. The analyses were performed in the Software Statistical Package for the Social Sciences (SPSS), version 25.0 of the powerful statistical software platform IBM and R – an environment with an integrated set of software resources for data processing, calculations, and graphical display.¹³ Descriptive statistics included means, medians, standard deviations, and interquartile interval (IQ) Q1–Q3 (25–75%) for the study indicators. To test the hypothesis that the selected indicators were not correlated with each other, a correlation matrix was proposed from the calculation of Spearman's position correlation coefficient. The tests considered a bidirectional α of 0.05 and a confidence interval (CI) of 95%.

Choropleth maps were also plotted with the indicators selected for their evaluation and distribution in the area studied, in the period of 2017 and 2018. The maps were developed in the Quantum Geographic Information System (QGIS) software, an open-access multiplatform of geographic information system that allows the visualization, editing and analysis of georeferenced data.¹⁴

This study is part of a macro project that evaluated population Coverage of Primary Care teams in Santa Catarina municipalities and the scope of indicators according to the data of the

interfederative agreement 2017-2021. In this macro project, each indicator was treated as an analysis variable. As the interfederative agreement has 23 indicators, each of them was identified by the letter V (indicating that it is a variable) followed by an Arabic number (from 1 to 23). Thus, in Spearman's correlation matrix, presented in this study, the variable rate of premature Mortality from CNCD will be presented as V5 and the variable population Coverage of Primary Care teams will be presented as V23.

The ethical aspects of research with human beings were considered during the investigation, according to resolution no. 466 of 2012 of the National Health Council and complementary. This work was based on secondary data sources, in the public domain and, therefore, did not need to be evaluated by an ethics committee. The research did not imply a risk to the subjects and followed the ethical principles of respect for the person, charity and justice, guidelines, and regulatory standards.

Results

The rate of premature mortality from CNCD increased in Santa Catarina between 2017 and 2018. This indicator averaged 312 in 2017 and 312.7 in 2018. Population coverage of primary care teams presented lower averages in 2018 compared to 2017, which averages were 82.8 in 2017 and 82.4 in 2018, as shown in Table 1.

Table 1 - Premature Mortality rate from Non-Communicable Chronic Diseases and population Coverage of Primary Care teams in the state of Santa Catarina in 2017 and 2018. Brazil, 2019

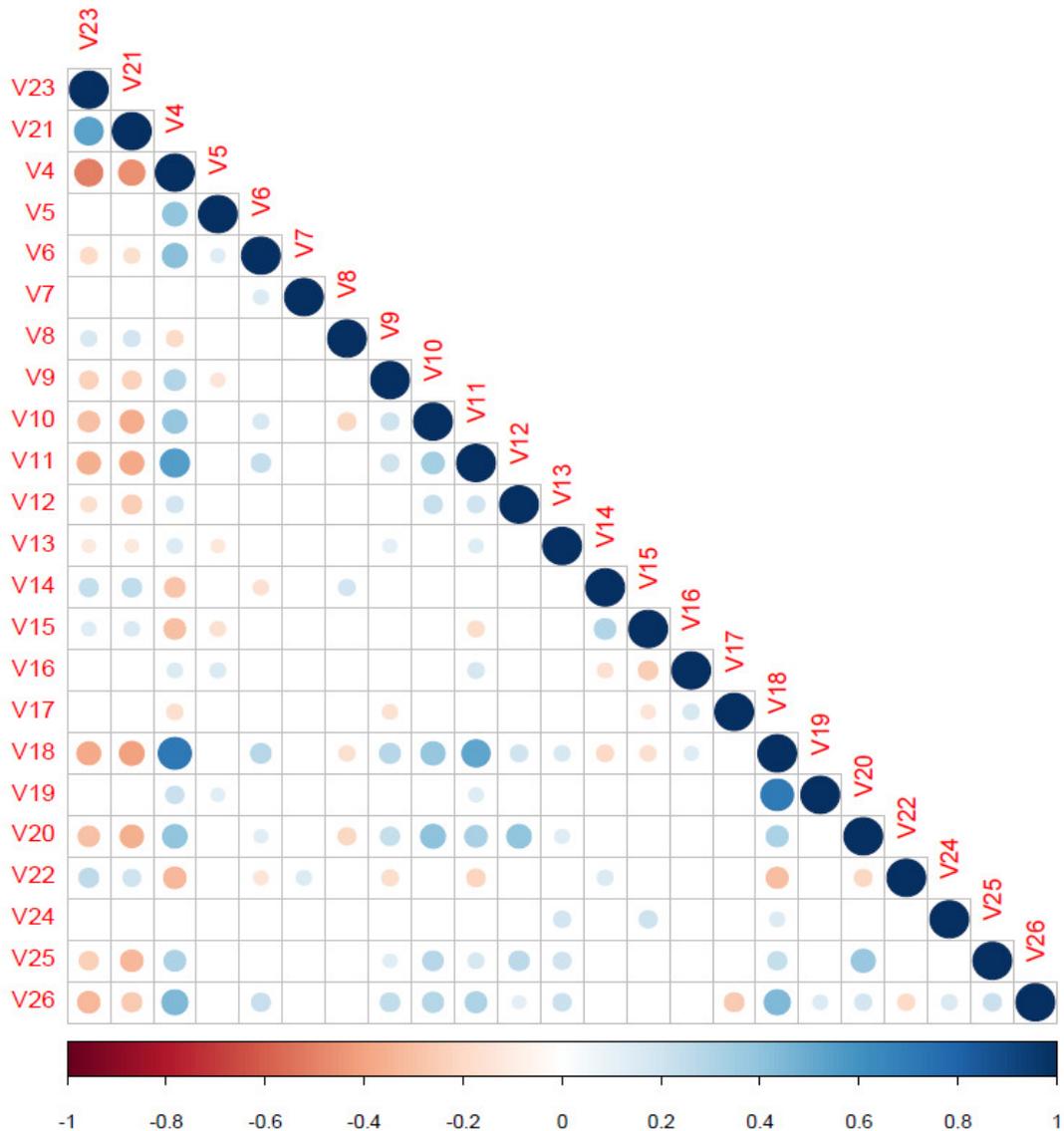
Indicator		Year	Mean	Median	Standard Deviation	Percentile 25	Percentile 75
Premature Mortality rate from CNCD*	2017	312.0	304.3	127.9	234.9	387.5	
	2018	312.7	305.5	126.7	231.2	373.3	
Population Coverage of teams [†]	2017	82.8	100.0	25.3	65.4	100.0	
	2018	82.4	100.0	25.5	66.7	100.0	

Source: DIVE/SC

* number of deaths in the population between 30 and 69 years old per 100,000 inhabitants between 30 and 69 years old; † percentage of individuals covered by Family Health team, parameterized Primary Care and equivalent teams.

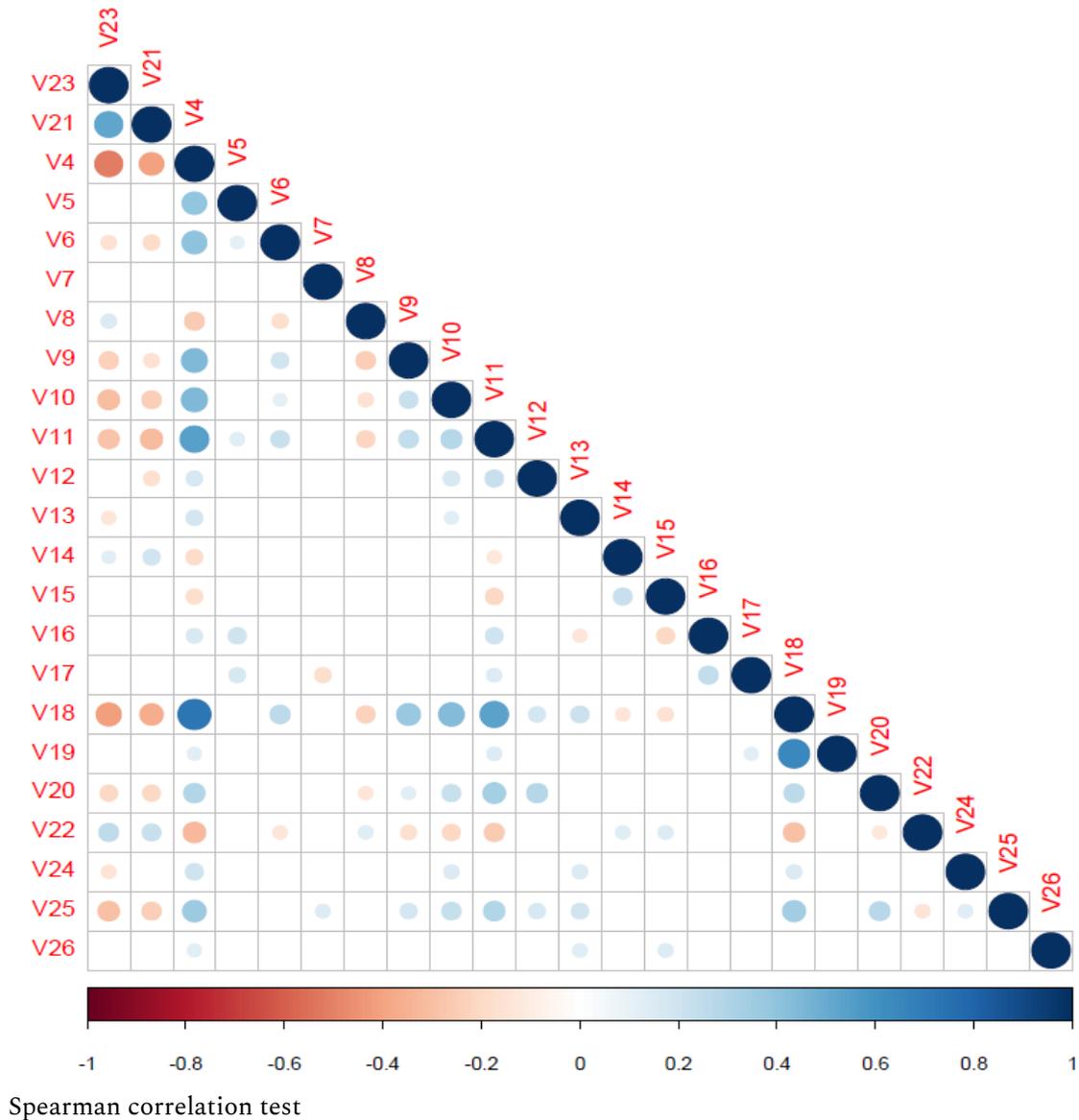
The correlation matrix in Figures 1 and 2 shows the various indicators agreed in the State of Santa Catarina in 2017 and 2018. In this study, we evaluated the correlation of the indicator “premature Mortality rate from CNCD” (V5) and “population Coverage of Primary Care teams” (V23). The correlation coefficient is in the color bar, so the darker the color the better correlated the indicator. The balls that appear in the background (lighter) in the matrix were those that were not statistically significant ($P > 0.05$).

Figure 1 - Correlation matrix of the rate of premature Mortality from Chronic Non-Communicable Diseases (V5) and population Coverage of Primary Care teams (V23) in the state of Santa Catarina in 2017. Brazil, 2019



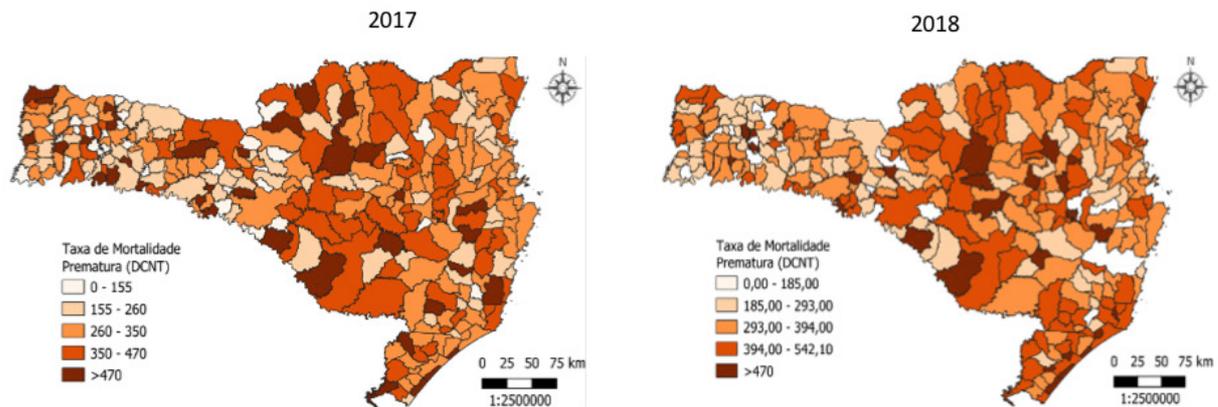
Spearman correlation test

Figure 2 - Correlation matrix of the rate of premature Mortality from Chronic Non-Communicable Diseases (V5) and population Coverage of Primary Care teams (V23) in the state of Santa Catarina in 2018. Brazil, 2019



From the correlation matrix presented in Figures 1 and 2, it is evident that the rate of premature Mortality from CNCD was not correlated with population Coverage of Primary Care teams in the years 2017 and 2018. This is because the balls appear in the background at the intersection between V5 and V23, indicating that the correlation between these indicators did not present significance from the statistical point of view. Also, regarding the rate of premature Mortality from CNCD, Figure 3 presents its distribution in the different municipalities of Santa Catarina, in the years 2017 and 2018, through a thematic map.

Figure 3 - Thematic map of the indicator premature Mortality rate from Chronic Non-Communicable Diseases in the State of Santa Catarina in the years 2017 and 2018. Brazil, 2019



In the map shown in Figure 3, the darker the color of the municipality, the higher the rates of premature mortality from CNCD. When comparing mortality rates from CNCD in the period studied, it is possible to observe that in 2017, 30 municipalities had a mortality from CNCD between 0-155, 65 municipalities between 155-260, 99 municipalities between 260-350, 65 municipalities between 350-470 and 36 municipalities above 470. In 2018, 25 municipalities had a mortality rate from CNCD between 0-155, 70 municipalities between 155-260, 97 municipalities between 260-350, 76 municipalities between 350-470 and 27 municipalities above 470.

Discussion

This study showed an increase in the rate of premature mortality from CNCD in the State of Santa Catarina between 2017 and 2018. This increase is also observed in the municipalities individually as shown in the maps in Figure 3. This data differs from that observed in other countries and in Brazil as a whole, in which research has shown a reduction in the rates of this indicator, since these diseases are sensitive to health and care promotion interventions.^{10,15} A study that evaluated the time series of the premature Mortality rate from CNCD from 2000 to 2013 in Brazil showed a decrease of 2.5% per year. All Brazilian regions showed a decrease trend in this indicator, and the rates in the Northeast exceed those of the other regions.⁴ Another study that verified the variation in the rate of premature Mortality from CNCD in the federative

units of Brazil and in the Federal District from 2006 to 2014, showed that there was a significant decrease of this indicator in the country and that Santa Catarina had a reduction of 2.8%.¹⁶

In this study, however, it is possible to observe that, in the period studied, 115 municipalities had an increase in the rate of premature mortality from CNCD, which corresponds to 38.98% of the municipalities of Santa Catarina. The others reduced or maintained the same rate. Therefore, despite a downward trend of this indicator in the state observed in previous years, there are still fluctuations. The increase of this indicator in Santa Catarina between 2017 and 2018, evidenced in this study, highlights the need to evaluate public health policies related to the reduction of premature mortality from CNCD in the state. This will only be possible with health promotion and care interventions since CNCD are the leading causes of death in all five Brazilian regions.⁴

The indicators of agreement, including the premature mortality rate, are not simply numbers, but attributions of value to objectives, events, or situations, according to the desired final result. They are essential in monitoring and evaluation processes because they allow them to monitor the achievement of goals.⁵

The reduction in the probability of premature death from CNCD by 30% until 2030 was one of the SDG proposed by the Assembly of Nations in 2015, continuing the commitment already made by the World Health Assembly.⁴ In Brazil, as already mentioned, the goal is to reduce the premature mortality rate by 2% per year by 2022.⁶ From this national parameter, the targets for this indicator are set by each state, according to the rates of previous years.⁵

The target agreed by the state of Santa Catarina was 283 in 2017 and 277 in 2018.¹⁷ In this sense, it is worth noting that, in the period studied, Santa Catarina did not reach the goals proposed in the rate of premature Mortality from CNCD. This data differs from another study that showed that Brazil achieved these goals,⁴ which reinforces the need for critical analysis of the results obtained and the decision-making process, as well as for continuous improvement of

organizational processes related to this indicator in the state. The reduction of premature mortality rates depends on the implementation of public health policies for the prevention and control of chronic diseases, as well as their risk factors such as smoking, alcohol consumption, unhealthy diet and physical inactivity¹⁸, and a strong and well-prepared Primary Care is essential to achieve these objectives.

In this sense, this study showed a decrease in population Coverage of Primary Care teams between 2017 and 2018. Moreover, the state did not reach the agreed targets for this indicator in the years 2017 and 2018, which were 88.35% and 88.16%, respectively.¹⁷ There is no national parameter defined for this indicator, and the target agreed by the states should consider the epidemiological reality of each federated entity.

It is worth noting that the greater the population coverage of Primary Care, the greater the potential for basic health actions and services to the population. Although this indicator measures the workload of professionals and not the work effectively performed by them, measuring the potential offer of Primary Care services helps to understand the access to this level of care.¹⁹ The decrease of this indicator in the state also deserves a discussion about actions that can strengthen Primary Care teams.

The literature indicates that the first study, based on national data, which estimated and discussed the coverage of Primary Care was published in 2017 with data from 2012. This study showed high coverage of Primary Care in most Brazilian states, higher than 70%. The study also highlights the importance of new studies to monitor and evaluate this indicator.¹⁹

It was evidenced that population Coverage of Primary Care teams did not influence the rate of premature Mortality due to CNCD. This data, in turn, is in line with a study that confirmed the hypothesis that universal coverage is a key element to achieve global objectives, but also showed worse health indicators (related to Tuberculosis) in municipalities with greater coverage of Primary Care.²⁰

It is possible to infer that based on the guideline about the expansion and qualification of access to quality health services, with emphasis on humanized care, equity and care for health needs, better population coverage of Primary Care teams can bring better results in people's health.⁵ However, individually may not be enough to reduce premature Mortality from CNCD. This is because Primary Care Coverage orders care in the health system and favors its problem-control capacity,⁵ although, other aspects are also mentioned in the literature in the sense of reducing premature mortality due to CNCD.

Among these aspects, it is worth mentioning that another study²¹ pointed out an association between social determinants (worse socioeconomic conditions) and worse health outcomes (greater susceptibility to the development of CNCD, as well as their comorbidities and higher mortality rates). Social determinants generate living patterns that cause lifelong damage that can lead to CNCD and premature death caused by them.²¹⁻²⁴ Thus, although this study did not show a causal relationship between population Coverage of Primary Care teams and the rate of premature mortality from CNCD, it points out the multicausality of premature death due to these conditions and the importance of studies in this area to identify their predictor variables. Therefore, it is necessary to deepen these findings with other studies that include other variables of analysis to understand this phenomenon.

Among the limitations of this study, it is noteworthy that, despite efforts to reduce sub records, events that are not identified in the use of secondary data may occur. This limitation does not reduce the reliability of the study but should be considered in the interpretation of the results.

Conclusion

This study showed that the state of Santa Catarina increased its rates of premature Mortality from CNCD in the period studied and did not reach the agreed goals for the period. Population Coverage of Primary Care teams decreased between 2017 and 2018 in Santa Catarina

and this fact was not associated with the increase in the rate of premature Mortality from CNCD.

This shows that despite the decreasing trends of this indicator in Brazil and efforts to consolidate Primary Care, the state still presents instability in the control of premature mortality from CNCD. In this sense, it is necessary to consider both the policies of prevention and control of CNCD and the factors involved in premature mortality due to these conditions. The care model adopted in Primary Care, the evaluation of the actions performed by the teams in Primary Care and the social determinants of health are important aspects to be considered in reducing the rate of premature mortality from CNCD.

Therefore, the contributions of this work are made in the scope of organizational management because it allows to direct decision-making in relation to the reduction of premature mortality rates from CNCD in Santa Catarina. In the light of the findings, it is recommended to strengthen the actions of prevention and control of CNCD in the state, and future studies related to the identification of predictor variables of premature mortality from CNCD.

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