Strategies to reduce the consumption of nutrients critical to health: the case of sodium

Estratégias para redução do consumo de nutrientes críticos para a saúde: o caso do sódio

Estrategias para la reducción del consumo de nutrientes críticos para la salud: el caso del sodio

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Abstract

Chronic non-communicable diseases correspond to the main cause of death in the world and have inadequate nutrition as one of its main modifiable risk factors, highlighting the excessive consumption of sodium and its association with cardiovascular diseases, mediated by blood pressure. This study evaluated the impact of different policy scenarios for reducing sodium consumption from processed and ultra-processed foods in the prevention of deaths due to cardiovascular outcomes in the adult population in Brazil. We used secondary data from public reports and databases of the Brazilian Unified National Health System (SUS) and population surveys. We analyzed the impacts, up to 2027, of three scenarios: maintenance of the current voluntary targets, and two mandatory scenarios, considering the lowest targets in the Americas and the lowest global targets. The Preventable Risk Integrated ModEl *(PRIME) analyzed the deaths prevented or delayed from sodium consumption in such scenarios. In 2027, more than 72,000 deaths would be attributed to excess sodium; the voluntary goals would result in the prevention or postponement of up to 4,001 (95% uncertainty intervals – 95%UI: 1,611-6,563) deaths, while the mandatory scenarios would result in the prevention of 9,704 (95%UI: 3,955-15,665) and 15,561 (95%UI: 6,350-25,096) deaths from cardiovascular diseases, considering the lower regional and international targets, respectively. The findings suggest that the maintenance of voluntary targets has limited impact when compared to possible and more restrictive scenarios of reducing sodium content in processed and ultra-processed foods and reinforce the need to adopt measures with greater effectiveness in the country.*

Sodium; Food; Noncommunicable Diseases; Simulation Technique; Mortality

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Introduction

Chronic Non-Communicable Diseases (NCDs) are an important public health problem because they are globally the main cause of death in recent decades, and cardiovascular diseases have been contributing most to deaths due to NCDs [1]. In Brazil, cardiovascular diseases account for about 30% of deaths [2] and have a high economic impact, with the direct and indirect costs of cardiovascular diseases estimated at BRL 37.1 billion in 2015, which corresponded to 0.7% of the country's Gross Domestic Product (GDP) [3]. Of all NCDs, arterial hypertension costed more than BRL 2 billion per year for the Brazilian Unified National Health System (SUS) in 2018 [4].

Inadequate nutrition stands out among the main modifiable risk factors for the occurrence of NCDs. A total of 11 million deaths and 255 million disability adjusted life tears (DALYs) are attributed to dietary risk factors, among which high sodium intake contributes to three million deaths and 70 million DALYs [5]. Considering the documented association of high sodium intake with increased blood pressure and with the increased risk of cardiovascular disease, stroke and coronary heart disease in adults, the World Health Organization (WHO) recommends that sodium intake be less than 2g/day, the equivalent of 5g/day of salt [6].

In Brazil, the average salt consumption is 9.3g/day, almost double that recommended by WHO [7]. According to the *Brazilian Household Budget Survey* (POF 2008-2009), which evaluated the food consumption of the Brazilian population, the main dietary sources of sodium are the direct addition of salt and salt-based seasonings to foods (74.4%) and the consumption of processed and ultra-processed foods (20.5%) [8,9]. It is estimated that the reduction of the average salt intake of Brazilians to 5g/day in adults over 30 years could prevent or delay more than 46,000 deaths per year from cardiovascular diseases and save BRL 662 million in costs to the SUS with the treatment of cardiovascular diseases [10,11].

The WHO proposes the goal of reducing the average population sodium intake by 30% by 2020 as a strategy to contribute to the prevention and control of NCDs [12]. Nationally, to cope with NCDs, the Brazilian National Food and Nutrition Policy (PNAN) addresses the reduction of salt consumption [13], especially from the *Food Guide for the Brazilian Population* [14], which provides the guideline for the promotion of adequate and healthy food, and, additionally, through the reformulation agenda of the nutritional profile of processed and ultra-processed foods. Also, there is the Strategic Action Plan to Tackle Non-Communicable Diseases, which established the goal of reducing the average consumption of salt and showed the regulation of the nutritional composition of foods to reduce sodium levels as one of the main actions in the healthy eating axis, aiming to preventing NCDs and promoting health [15].

Overall, the reduction of sodium content in processed and ultra-processed foods is recognized as cost-effective for reducing sodium consumption at the population level [16]. To this end, voluntary or regulatory (mandatory) strategies have been commonly implemented to establish maximum and sometimes average sodium limits in foods around the world [17,18,19,20,21]. Based on the experience of countries in the Americas, including Argentina, Brazil, Canada, Chile and the United States, the Pan American Health Organization (PAHO) has also proposed regional goals, aiming to support countries at different stages of developing national policies related to food reformulation [22].

In Brazil, since 2011, voluntary agreements between the Brazilian Ministry of Health and the associations of the food production sector have been implementing the food reformulation agenda. The agreements set out the agreed targets, i.e. the establishment of maximum limits, for the gradual reduction of sodium levels in priority categories of processed and ultra-processed foods, including salt-based seasonings and bouillon cubes [23,24,25,26,27,28]. The results of the monitoring of these agreements show that more than half of the priority categories showed a significant reduction of 8 to 34% of the average sodium content of food, in the period from 2011 to 2017 [29]. Despite the positive results of meeting the voluntary goals, the associations of the food production sector have limited coverage and represent around 70% of the market, currently. In addition, the agreed targets can still be more restrictive in order to achieve greater reductions in sodium levels in foods, considering limits applied in other countries and, thus, provide lower health risks [21,30,31,32].

Thus, this article aims to evaluate the impact of different policy scenarios for reducing sodium consumption from processed and ultra-processed foods on the prevention of deaths due to cardiovascular outcomes in the adult population in Brazil.

Materials and methods

This study was based on secondary data, obtained from official reports and public databases of SUS health information systems and population surveys, and therefore is exempt from ethical approval. The design of the study was based on the estimation of the reduction of per capita sodium consumption by the Brazilian population in different scenarios of targets for maximum sodium limits and the impact in terms of attributable deaths through statistical modeling by macrosimulation in these scenarios, from the data synthesized in Box 1.

Sample and study population

• **Data collection**

The data on sodium levels in foods covered different categories of processed and ultra-processed foods, contemplated in the Brazilian voluntary agreements and which, according to the POF of 2008-2009, contributed mostly to excessive sodium intake. They were: instant noodles, sliced bread, dinner rolls, cakes and cake mixtures, rocamboles, sweet, salted and stuffed cookies, French fries and shoestring potatoes, corn chips, mayonnaise, margarine, morning cereals, ready-made bouillon cubes, seasonings, soups, meat products (hamburgers, sausages, ham and breaded foods) and dairy products.

Box 1

Summary of the main data used in the modeling of deaths attributable to salt consumption by macrosimulation (*Preventable Risk Integrated ModEl* – PRIME) and its sources.

DATA	VALUE [RR (95%CI)]	SOURCE
Baseline characteristics		
Demographic data		Brazilian Institute of Geographic and Statistics [41]
Salt consumption		*Brazilian National Health Survey*, 2013 [7]
Deaths from cardiovascular disease		Brazilian Mortality Informations System
Effect of salt consumption on systolic blood pressure	-5.80 (-2.50-9.20)	He et al. [37]
Relative risks of cardiovascular disease associated with systolic blood pressure	Change unit: 20mmHg systolic blood pressure reduction	Lewington et al. [42]
Ischemic heart diseases	< 49 years: 0.49 (0.45-0.53) 50-59 years: 0.50 (0.49-0.52) 60-69 years: 0.54 (0.53-0.55) 70-79 years: 0.60 (0.58-0.61) More than 79 years: 0.67 (0.64-0.70)	
Cerebrovascular diseases	< 4 9 years: 0.36 (0.32-0.40) 50-59 years: 0.38 (0.35-0.40) 60-69 years: 0.43 (0.41-0.45) 70-79 years: 0.50 (0.48-0.52) More than 79 years: 0.67 (0.63-0.71)	
Hypertensive disease	0.22 (0.20-0.25)	
Heart failure	0.53 (0.48-0.59)	
Pulmonary embolism	0.72 (0.60-0.87)	
Rheumatic heart disease	0.74 (0.61-0.89)	
Aortic aneurysm	0.55 (0.49-0.62)	

95%CI: 95% confidence interval; RR: relative risk.

Such data are available in the reports containing an evaluation of the agreed targets for sodium reduction in priority categories of processed foods within the framework of the National Plan for Sodium Reduction in Processed Foods of the Brazilian Ministry of Health [32,33,34]. We obtained the information from the declaration of the sodium content available on the food label by an information search of the mandatory nutritional labeling, conducted on the official websites of companies. When this information was not available, we requested the data from contacting the Consumer Service Department (SAC) through e-mail and/or telephone. An electronic spreadsheet, developed to consolidate the information of these foods, recorded the collected data.

We obtained the sodium consumption of the Brazilian population in 2013, disaggregated by age group and sex, from the microdata of the laboratory analyses of the *Brazilian National Health Survey* (PNS 2013) [7]. Food consumption was obtained from the microdata of POF 2008-2009 [35]. The two surveys, conducted by the Brazilian Institute of Geography and Statistics (IBGE), are representative household surveys of the Brazilian population, with regional breakdown and by urban and rural area; data on food consumption (POF) and urinary sodium excretion (PNS) are also disaggregated by sex and age group for the adult population.

In this study, we obtained demographic and mortality data, respectively, from the public databases of the IBGE and the Brazilian Mortality Information System of the SUS (SIM/SUS). We stratified the population and mortality data by sex, considering age groups with intervals of 5 years, and based the causes of death on the International Classification of Diseases, 10th revision (ICD-10).

Data analysis

We estimated the average sodium levels in the food categories from the data collected, after standardization of the sodium levels of the portion identified in the nutritional labeling for 100g of each food. Then, we performed a descriptive analysis of the data in terms of measures of central trend (means and medians) and dispersion (standard deviations and maximum and minimum values), considering the sodium levels at two distinct moments: at the baseline, that is, the period before the agreement of targets (between 2011 and 2013); and in the official monitoring of compliance with the targets carried out in 2017.

We estimated sodium consumption in 2017 from the difference between the consumption evaluated in 2013 [7] and changes in sodium consumption, calculated from the consumption of processed and ultra-processed foods using the POF 2008-2009 microdata [35]. Therefore, we assumed that food consumption (in kilograms) would not change over time, replacing the amount of sodium in each product (in g/100g) by the average sodium content of the products in 2011 (baseline) and in 2017 (counterfactual scenarios). We calculated the most pessimistic counterfactual scenario (maintenance of national voluntary targets) considering the maximum voluntary limits for 70% of the consumption of each category, corresponding to the estimated representativeness of the Brazilian Association of Food Industries (ABIA) in the Brazilian market, and considering the average sodium content of the remaining 30% unchanged, corresponding to the products of the companies that are not part of the voluntary agreements (equal to the average content in the baseline). The other two scenarios presuppose mandatory limits, that is, established by specific regulations, which reach the entire Brazilian market. The intermediate scenario corresponds to the replacement of the maximum sodium limit in each category by the lowest national target in the Americas, in 2014 [22]; and the optimistic scenario, to the replacement of the maximum sodium limits by the lowest targets in force in the world, in 2017-2018 [21,30,31].

We used sodium consumption in each reduction scenario, based on voluntary and mandatory policies and the maximum consumption recommended by the WHO (2g sodium or 5g salt), as inputs for the modeling of prevented or delayed deaths in 2027, compared to sodium consumption at the baseline in 2013, using the *Preventable Risk Integrated ModEl* (PRIME) [36]. The modeling of the policy scenarios incorporated the lag time of a few weeks between changes in the food profile (reduction of sodium content), the estimated sodium consumption and the onset of systolic blood pressure reduction [37], and from five years for changes in cardiovascular outcomes in the adult population aged 30 years or older, which gradually increase from then on [38,39,40]. Thus, the impacts of having reduced

sodium content by 2017 will result in impacts on cardiovascular mortality after 2022, and it was assumed that they would approach their maximum impact after 10 years or more after reduction in consumption (2027). To estimate mortality in 2027, we assumed that the mortality per inhabitant would remain proportional to that of 2017, adjusted by population and age distribution and by sex estimated for 2027 [41].

PRIME is a macrosimulation scenario modeling methodology developed by the University of Oxford (United Kingdom) to estimate changes in gender-adjusted distribution and age group from changes in one or more risk factors for NCDs, such as diet, physical activity, alcohol consumption and smoking, in population mortality, including intermediate factors such as body mass index (BMI), blood pressure and blood cholesterol. The model parameterizes the risk factors and mortality due to NCDs based on meta-analyses of epidemiological studies [36].

The data used by PRIME include estimates of annual deaths from NCDs by sex and age group, population by sex and age group, distribution of behavioral risk factors at the baseline and distribution of risk factors in the counterfactual scenario of interest (in this case sodium consumption in each scenario).

The parameterization of sodium intake, changes in systolic blood pressure [37] and alterations in blood pressure and cardiovascular outcomes [42] are the basis for the estimates of the impact of sodium intake on cardiovascular outcomes through PRIME. The model first parameterizes the changes in sodium consumption, converted into equivalent salt consumption, and their effects on systolic blood pressure (SBP), creating a linear estimate of SBP increase for each gram of salt added to the diet, and then parameterizes these 1g intervals in salt consumption to generate a combined relative risk to associate sodium consumption with mortality due to cardiovascular diseases, mediated by blood pressure.

Within the model matrix, we performed a sensitivity analysis to generate medians and 95% uncertainty intervals (95%UI), with 10,000 interactions in Monte Carlo simulations, which calculates, in a probabilistic way, the distribution of the model input parameters (salt/sodium consumption, relative risks and mortality) to adjust the final results of the modeling [43,44].

In general, modeling studies with probabilistic approaches represent an estimate of the magnitude of the impact of different policies or counterfactual scenarios, and this should guide the interpretation of the results. The results uncertainty intervals, on the other hand, express the uncertainty of the model input parameters, including the uncertainties of exposure to risk factors (such as sodium consumption variance) and the relative risks of meta-analyses, through sensitivity analysis.

Results

Considering the more pessimistic counterfactual scenario, that is, the maintenance of the Brazilian voluntary targets, we estimated that the average salt consumption per capita would decrease, between 2013 and 2017, to 9.1g/day (pessimistic scenario). On the other hand, considering mandatory targets in the same period, the average consumption would decrease to 8.8g/day if applying the lower targets of the Americas (intermediate scenario), and to 8.5g/day if adopting in Brazil the lower international targets (optimistic scenario), as detailed in Table 1.

If by 2027 the average salt consumption in Brazil in 2013 (at 9.3g/day) remained unchanged, the mortality attributable to excessive salt consumption (greater than 5g/day) would be 72,399 deaths (95%UI: 30,314-112,781) in 2027. From these changes in consumption, we estimated the deaths prevented or delayed in each reduction scenario. The continuity of voluntary sodium reduction targets could result in the prevention and delay of up to 4,001 deaths (95%UI: 1,611-6,563) from cardiovascular diseases in Brazil by 2027, of which 2,242 deaths are due to ischemic heart disease and cerebrovascular diseases.

Considering the regulatory scenarios of targets for sodium content in processed and ultra-processed foods, we estimate that, in the same period, the adoption of the lowest regional PAHO targets would lead to more than double (9,704 deaths, 95%UI: 3,955-15,665) and the lowest international targets, to almost four times more deaths prevented or delayed (15,561 deaths, 95%UI: 6,350-25,096). Considering ischemic heart disease and cerebrovascular disease, the adoption of the lowest regional

Table 1

Average salt consumption (g/day) at the baseline of the analyses (2013) and the estimated consumption in 2017, in each target scenario for sodium reduction.

	Baseline		Pessimistic scenario		Intermediate scenario		Optimistic scenario	
	Mean	95%CI	Mean	95%CI	Mean	95%CI	Mean	IC95%
Total	9.34	9.27-9.41	9.09	9.02-9.16	8.82	8.76-8.89	8.54	8.47-8.60
Men (years)								
30-44	9.56	9.40-9.72	9.31	9.15-9.47	9.04	8.89-9.20	8.76	8.60-8.91
45-60	9.28	9.16-9.40	9.03	8.91-9.15	8.76	8.65-8.88	8.48	8.36-8.59
Over 60	9.01	8.85-9.17	8.76	8.60-8.92	8.49	8.34-8.65	8.21	8.05-8.36
Women (years)								
30-44	9.29	9.14-9.45	9.04	8.89-9.20	8.78	8,62-8,93	8.49	8.33-8.65
45-60	9.02	8.90-9.14	8.77	8.66-8.89	8.50	8.39-8.62	8.22	8.10-8.33
Over 60	8.76	8.60-8.92	8.51	8.35-8.67	8.24	8.09-8.40	7.95	7.80-8.11

95%CI: 95% confidence interval.

targets in the Americas would prevent or postpone 5,479 deaths, and 8,815 deaths with the lowest international targets (Table 2).

In all scenarios, more than half of the prevented or delayed deaths would be in people under 75 years of age, reaching 59% among men and 37% among women. Among the causes of death, 57% are attributed to ischemic heart diseases (predominantly myocardial infarction) and cerebrovascular diseases (strokes), as well as 33% to hypertensive diseases and 7% to heart failure.

Discussion

This study reinforces that excessive sodium consumption is a public health problem in Brazil and that, if we maintained the levels of sodium consumption of 2013, more than 72 thousand deaths from cardiovascular diseases could be attributed to excessive sodium consumption in 2027. Considering the different scenarios of sodium content reduction, the maintenance of the strategy of voluntary targets in the country until 2027 could prevent or delay 5.5% of these deaths, while if we adopted mandatory targets according to the lower limits adopted in the Americas and the world, respectively, 7.6% and 12.2% of deaths attributable to excess sodium could be prevented or delayed.

Therefore, the voluntary targets established for the reduction of sodium content in processed and ultra-processed foods will have limited impacts in relation to the mandatory adoption of other regional and global reduction benchmarks. In this sense, there are three main explanations: the limited scope and adherence to reductions by industries, the amount of categories involved and the maximum limits practiced so far in Brazil, based on the voluntary agreements [45].

Regarding the achievement of voluntary goals, in the Brazilian case, the goals have as a limit the market representativeness of the companies that are part of ABIA, with which the Brazilian Ministry of Health established these voluntary commitments, estimated at 70%. In addition, related to the fulfillment of the goals, even within the universe of manufacturers belonging to the association, not everyone achieves the stipulated goals, and there are no mechanisms of pressure or sanctions applicable. For example, the achievement of the targets by industries in Brazil has shown a percentage drop in the last official monitoring from 90% to 87%, between 2013 and 2017; while many categories had reached the targets above 90%, some categories had percentages lower than 70% [32,33,34].

In this sense, mandatory reduction targets, established by specific regulations, can generate repercussions and health sanctions in the event of non-compliance, in addition to being applicable to all products and manufacturers in the national market. Argentina is an example of a country where

Table 2

Total mortality attributable to excess sodium and estimate of prevented or delayed deaths and their 95% uncertainty intervals (95%UI) in scenarios of reducing sodium consumption in Brazil, in 2027.

| | | Deaths prevented or delayed [n (95%UI)] | | |
	Total *	Pessimistic scenario	Intermediate scenario	Optimistic scenario
Total	72,399 (30,314-112,781)	4,001 (1,611-6,563)	9,704 (3,955-15,665)	15,561 (6,350-25,096)
Men	37,155 (15,619-57,644)	1,940 (782-3,174)	4,693 (1,919-7,590)	7,530 (3,080-12,111)
Women	35,292 (14,715-55,191)	2,062 (829-3,380)	5,011 (2,046-8,087)	8,026 (3,278-12,950)
Ischemic heart diseases	22,978 (9,599-36,405)	1,218 (493-1,958)	2,972 (1,227-4,740)	4,777 (1,951-7,640)
Cerebrovascular diseases	19,253 (8,098-30,028)	1,024 (418-1,668)	2,507 (1,032-4,036)	4,038 (1,643-6,472)
Heart failure	5,221 (2,153-8,360)	279 (114-466)	686 (275-1,132)	1,101 (450-1,820)
Aortic aneurysm	1,320 (556-2,165)	69 (28-119)	171 (68-282)	276 (113-458)
Pulmonary embolism	627 (191-1,233)	32 (9-64)	79 (23-163)	125 (38-250)
Rheumatic heart disease	144 (40-298)	7 (2-15)	18 (5-38)	29 (8-60)
Hypertensive diseases	22,840 (9,750-34,810)	1,367 (543-2,314)	3,268 (1,302-5,409)	5,190 (2,094-8,558)

* Deaths prevented or delayed if the average per capita salt consumption was 5g/day (2g sodium)

voluntary measures initiated national targets for sodium reduction in products and subsequently passed to regulatory limits [46,47]. Moreover, even in internationally recognized voluntary experiments with significant impacts on sodium consumption and population health outcomes, such as that of the United Kingdom [48], the decrease in the adherence of the productive sector and the weakening of official and external monitoring led to a large reduction in the impact of the measures [49].

The methodology adopted in Brazil to select priority categories based on participation in sodium consumption, according to national surveys, allows efforts to be directed to the main sources of sodium [23], but excludes from the targets around 10% of the categories. Thus, broadening the targets for other categories, including sauces, canned vegetables, other dairy products and ready-made foods, among others, may further increase the scope of reducing sodium consumption.

Finally, the maximum limits adopted in Brazil, compared to the lower limits in the Americas, in 2014 [22], in addition to the most recent targets in force in other countries, such as the United Kingdom, United States, Argentina and South Africa [20,21,30,31], show that there is technological feasibility for the production of foods with a lower sodium content. In 2017-2018, a regional study assessed that 81.2% of the products evaluated in Brazil met the regional sodium reduction targets in the Americas, considering categories such as breads, soups, mayonnaise, sweet and savory cookies, processed meats, morning cereals, requeijão, snacks and instant noodles [50]. Thus, there is still great scope for reducing the maximum sodium limits in products in Brazil, considering targets for the same categories in other countries.

The results of the analyses clearly show that the possible adoption of more restrictive targets, already adopted in other countries, and that reach the entire Brazilian market, through regulation, could multiply the potential impact in terms of prevented or delayed deaths by two or even close to four times.

Given that processed and ultra-processed foods and salt-based seasonings together account for close to 35% of sodium consumption in Brazil, it is also essential that national policies strengthen other measures to reduce sodium consumption. Considering other dietary sources of sodium, particularly added salt, and the consumption of ready-made food and preparations, which accounts for more than 65% of the consumed sodium, we will need multiple strategies that include food and nutritional education, dietary advice on health care services, measures within the framework of restaurants and food services (training of handlers, restricted use of salt shakers, reduced number of salt sachets, nutritional information on all preparations) and other regulatory measures (nutrition labeling on the front, regulated sale of food in canteens, regulation of the advertising of ultra-processed foods). Another possibility, which is using sodium substitutes, such as potassium and magnesium,

despite promising results in the world [51,52], should be evaluated with caution in view of the high underdiagnosis of chronic kidney diseases in Brazil [53].

The main strengths of the analyses performed in this study are the use of the most recent national aggregated data on mortality and sodium intake, disaggregated by sex and age, as well as the relative risks of good quality meta-analyses. Mortality macrosimulation analysis (PRIME) uses methodologies based on the *Global Burden of Disease* study in relation to the application of relative risks associated with NCDs and population attributable ratios or fractions, which allow comparisons between countries and regions.

On the other hand, among its weaknesses are the premises that needed to be incorporated in the modeling in view of the unavailability of data, such as more recent information on sodium intake and dietary sources and relative risks specific to the Brazilian population. Thus, we assumed that the consumption of food categories would not change between 2008-2009 and 2017 and that the consumption reductions would be equal for all sexes and age groups. Thus, future studies should produce more conservative estimates of preventable deaths, since the reduction in sodium intake by adults in the younger ranges should be underestimated.

The study highlights the different impacts of strategies to reduce sodium content in processed and ultra-processed foods, according to limits adopted for sodium content and how to apply targets (voluntary or mandatory), in terms of deaths due to cardiovascular outcomes in the adult population in Brazil. In this sense, mandatory strategies, more comprehensive in terms of food categories and with more restrictive sodium limits would allow to prevent or delay even more than twice as many deaths, compared to deaths prevented or delayed by the continuity of the current voluntary strategy.

Ex ante policy evaluations, as in the scenario modeling applied in this study, can contribute greatly to the implementation of more effective and, with the incorporation of economic evaluations, more cost-effective policies. The cost of inaction or the adoption of measures with less effectiveness can have a large burden on the health of the population, so food and nutrition policies based on new evidence of potential impacts can strengthen health impacts and support decisions.

Contributors

Additional informations

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Resumo

Doenças crônicas não transmissíveis correspondem à principal causa de morte no mundo e têm a alimentação inadequada como um de seus principais fatores de risco modificáveis, destacando-se o consumo excessivo de sódio e sua associação com doenças cardiovasculares, mediadas pela pressão arterial. Este estudo avaliou o impacto de diferentes cenários de políticas para a redução do consumo de sódio com base em alimentos processados e ultraprocessados na prevenção de mortes por desfechos cardiovasculares na população adulta no Brasil. Foram utilizados dados secundários, de relatórios e bases públicas do Sistema Único de Saúde e de inquéritos populacionais. Foram analisados os impactos, até 2027, de três cenários: manutenção das atuais metas voluntárias, e dois cenários mandatórios, considerando as menores metas nas Américas e as menores metas mundiais. Para a análise das mortes prevenidas ou adiadas com base no consumo de sódio em tais cenários foi utilizado o Preventable Risk Integrated ModEl *(PRIME). Em 2027, mais de 72 mil mortes seriam atribuíveis ao excesso de sódio e as metas voluntárias resultariam na prevenção ou adiamento de até 4.001 (intervalos de 95% de incerteza – II95%: 1.611-6.563) mortes, e os cenários mandatórios resultariam na prevenção de 9.704 (II95%: 3.955-15.665) e 15.561 (II95%: 6.350-25.096) mortes por doenças cardiovasculares, considerando as menores metas regionais e internacionais, respectivamente. Os achados sugerem que a manutenção de metas voluntárias tem impacto limitado quando comparada a cenários possíveis e mais restritivos de redução do teor de sódio em alimentos processados e ultraprocessados, e reforçam a necessidade de adoção de medidas com maior efetividade no país.*

Sódio; Alimentos; Doenças Não Transmissíveis; Simulação; Mortalidade

Resumen

Las enfermedades crónicas no transmisibles son la principal causa de muerte en el mundo y cuentan con la alimentación inadecuada, como uno de sus principales factores de riesgo modificables, destacándose el consumo excesivo de sodio y su asociación con enfermedades cardiovasculares, causadas por la presión arterial. Este estudio evaluó el impacto de diferentes escenarios de políticas para la reducción del consumo de sodio, en base a alimentos procesados y ultraprocesados, en la prevención de muertes por desenlaces cardiovasculares en la población adulta brasileña. Se utilizaron datos secundarios, de informes y bases públicas del Sistema Único de Salud y de encuestas poblacionales. Se analizaron impactos, hasta 2027, en tres escenarios: mantenimiento de las actuales metas voluntarias, y dos escenarios obligatorios, considerando metas menores en las Américas y las menores metas mundiales. Para el análisis de las muertes prevenidas o pospuestas, basándose en el consumo de sodio en tales escenarios, se utilizó el Preventable Risk Integrated ModEl *(PRIME). En 2027, más de 72 mil muertes serían atribuibles al exceso de sodio y las metas voluntarias resultarían en la prevención o aplazamiento de hasta 4.001 (intervalos de 95% de incertidumbre – II95%: 1.611-6.563) muertes, y los escenarios obligatorios resultarían en la prevención de 9.704 (II95%: 3.955-15.665) y 15.561 (II95%: 6.350-25.096) muertes por enfermedades cardiovasculares, considerando las menores metas regionales e internacionales, respectivamente. Los resultados sugieren que el mantenimiento de metas voluntarias tiene un impacto limitado, cuando se compara con escenarios posibles y más restrictivos de reducción del contenido de sodio en alimentos procesados y ultraprocesados, y refuerzan la necesidad de adopción de medidas con una mayor efectividad en el país.*

Sodío; Alimentos; Enfermedades No Transmisibles; Simulación; Mortalidad