Health, Environment and climate change: a Brazilian case

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Abstract

This study addresses extreme weather events, particularly heatwaves, presenting significant challenges to public health. Special attention is given to the impact of these heatwaves on cardiovascular and cerebrovascular health, affecting at-risk groups such as the elderly, hypertensive individuals, and obese individuals. Additionally, to illustrate, Brazil was presented as an example, registering a historic increase of 0.69°C above the average in 2023, emphasizing the findings that can be employed for the development of environmental projects such as urban afforestation and reforestation, as well as investments in infrastructure.

Introduction

Extreme climate changes, be they cold waves or heatwaves, are becoming increasingly frequent worldwide due to unchecked capitalist human actions (LIMA; ALEIXO, 2023). Consequently, we can observe that climate changes have transformed temperature and climate patterns over time, characterized by phenomena such as an increase in the global average temperature and climate alterations that may impact population health and well-being (UN, 2023).

High environmental temperatures are concerning and directly correlate with increased lethality of cardiovascular and respiratory pathologies, especially in at-risk groups such as the elderly, hypertensive individuals, and obese individuals (DINIZ, 2022). Thus, in 2021, the IPCC stated in its sixth report (AR6) that the global average temperature is expected to rise by 1.5°C in the coming decades, even with reduced greenhouse gas emissions (IPCC, 2021). Consequently, the trend of rising global surface temperatures promotes an increase in the intensity and frequency of heatwaves (IPCC, 2021).

Due to excessive heat, the human nervous system works to maintain a body temperature around 37°C through thermal regulation mechanisms, including evaporation, also known as perspiration (GUYTON; HALL, 2017). However, if water loss from the body is significant, i.e., greater than 10% of body volume, there will be a reduction in blood pressure and a decrease in cardiac output, with consequent attenuation of blood supply to vital organs such as the brain, which may lead to syncope or even an ischemic stroke (CAMARGO, 2011).

Furthermore, according to Campos (2022), severe dehydration caused by heatwaves can affect arterioles. Through a reduction in platelet concentration, there is a conducive environment for cholesterol accumulation in the intima of these vessels, favoring thrombus formation. In a way, if this mechanism propels thrombus formation, there is a risk of it detaching from the original site and the embolus reaching specific vessels, leading to Pulmonary Embolism, Acute Myocardial Infarction, or Acute Kidney Injury. This elevates the morbidity and mortality of cardiovascular diseases related to heatwaves.

Between 1998 and 2017, over 166 thousand people died due to heatwaves, including the 70 thousand deaths caused by the heatwave in Europe in 2003 (DINIZ, 2022). Thus, it is observed that climate changes have undergone transformations over time in temperature and climate patterns. Therefore, one of the goals of SDG 13, which includes climate action, health, and well-being, is linked to these changes associated with heatwaves and alterations in the perspective of population quality of life.

Brazilian case

Brazil is a tropical country naturally characterized by elevated temperatures throughout the year. However, due to climate changes, this scenario has been intensifying, and the average temperature in Brazil is rising even further over time, reaching a historic milestone in the year 2023 with a recorded temperature 0.69°C above the average and nine heatwave episodes throughout these 12 months (Instituto Nacional de Meteorologia, 2023).

This situation has implications across various sectors and is listed by the World Health Organization (2019) as a threat to human quality of life. Extreme heat increases the risk of health complications by disrupting systemic homeostasis and exacerbating cardiovascular diseases, which are documented as the leading cause of morbidity and mortality during heatwaves (Campos, 2022).

Studies conducted in different regions of Brazil provide evidence for the relationship between rising temperatures and the incidence of cardiovascular

events. According to Mandú et al (2019), a study conducted in Manaus-AM showed a positive association between climate change and an increase in hospitalizations, especially among the elderly, due to Acute Myocardial Infarction and Heart Failure two months after exposure to a heatwave.

Recent data indicated by Ramos (2023) assessed three capitals in north-eastern Brazil, yielding different results. In the first capital (Teresina-PI), there was a very insignificant association between heat and cardiovascular events, while in the others (Natal-RN and João Pessoa-PB), positive results were obtained, with an increase in the number of cases correlating with rising temperatures.

In this context, while not all studies establish a direct relationship, there is agreement that climate changes and the intensification of heat influence, even in the long term, the mortality of cerebrovascular diseases in Brazil and worldwide. Combating the warming process is deemed essential to maintain human health and quality of life.

Policy recommendations / conclusions

In light of the aspects presented in the introduction and the Brazilian case, it is evident that extreme climate changes, particularly heatwaves, significantly impact human health and quality of life. According to the findings presented here on the influence of rising temperatures and health alterations, a correlation between heat intensification and cardiovascular and cerebrovascular diseases can be established. The consequences of human actions, emphasizing unchecked capitalist and consumerist activities in intensifying the rise in average temperatures, as described by the National Institute of Meteorology, cannot be ignored. It is crucial to acknowledge that heatwaves are becoming more frequent and intense, directly impacting health and morbidity-mortality rates. Consequently, the urgency of measures to mitigate the negative effects of these events becomes evident, such as implementing more effective public policies aiming at reducing greenhouse gas emissions, promoting and incentivizing sustainable practices, along with increased investments in clean energy. In addition to this, public officials, along with businesses and non-governmental organizations, should invest in infrastructure, urban afforestation and reforestation projects, emergency-prepared healthcare systems, and public education on the primary causes of global warming.

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