

CLIMATE CHANGE AFFECTING HUMAN HEALTH

1 INTRODUCTION

Environmental transformations resulting from climate change are extremely important issues, as they directly impact the quality of life and health of the population. Climate change intensifies the frequency of extreme events, threatening people's safety, compromising air quality, and favoring the spread of vector-borne diseases, such as those transmitted by mosquitoes. Therefore, it is one of the greatest challenges of the 21st century, requiring conscious, preventive, and integrated action.

Understanding climate change involves identifying its causes and recognizing its multiple impacts on the environment, economy, and health.

This knowledge is essential for supporting the formulation of public policies, planning effective responses, and adopting sustainable practices in everyday life. More than a scientific issue, it is a global phenomenon that has profoundly shaped human life, ecosystems, and social organization. Changes in temperature patterns, rainfall regimes, and the occurrence of extreme events affect the natural balance and increase risks related to public health, food security, infrastructure, and biodiversity. In this context, climate change has become one of the greatest contemporary emergencies, accompanied by a significant increase in diseases associated with environmental factors.

Given this scenario, fundamental questions arise: Do the records of the responsible agencies show an increase in the hospitalization of people with morbidities and diseases that may be aggravated by climate change? Do health professionals and patients in public health facilities perceive this correlation? This study aimed to analyze the records of responsible agencies that report an increase in hospitalizations of people with morbidities and diseases that may be aggravated by climate change, as well as to verify whether health professionals and patients in public health facilities perceive this correlation.

The impacts of climate change on public health extend beyond diseases traditionally associated with heat, such as infectious, parasitic, and respiratory diseases. However, data from DATASUS, Information Technology at the Service of the SUS of the Ministry of Health (Brazil, 2025), also show an increase in mental disorders, neoplasms, and digestive tract diseases, which, according to the UN (2025), influence these trends. However, field research has shown a lack of awareness among health professionals and patients regarding the relationship between the increase in mental disorders, neoplasms, and digestive tract diseases and high temperatures. This reveals an important challenge: to broaden the collective understanding of how climate affects not only the environment but also food security, lifestyle, and the physical and emotional balance of the population.

2. THEORETICAL FOUNDATIONS

Global climate change has significantly impacted the mental health of populations in several regions, contributing to the worsening of humanitarian crises. In these situations, climate threats interact with contexts of high vulnerability, intensifying impacts in all parts of the world. The increase in the frequency and intensity of extreme heat events has resulted in higher mortality and morbidity rates. Simultaneously, there has been an increase in the incidence of diseases related to food and water contamination, which is directly influenced by climate change (UN, 2023).

In addition, vector-borne diseases have expanded geographically and increased in frequency as a result of the expansion of the area of activity and reproduction rate of vector organisms. Human and animal diseases, including zoonoses, are emerging in previously

unaffected territories, revealing new epidemiological configurations. According to Patz (2016), climate change represents one of the greatest threats to global health, especially because of the proliferation of vector-borne diseases driven by rising temperatures. Fernandes (2021) adds to this by highlighting that air pollution, exacerbated by climate change, is directly associated with an increase in cases of respiratory and cardiovascular diseases.

However, the José Alencar Gomes da Silva National Cancer Institute (INCA, 2021) has pointed out that cancer is a multifactorial disease, the prevalence of which can be intensified by the interaction between genetic elements and environmental exposures. Air quality poses a significant risk. According to the International Agency for Research on Cancer (IARC), atmospheric pollution and its particles have been categorized as carcinogenic to humans, supported by robust evidence of their ability to induce cancer in individuals and animals. In work environments, exposure to contaminants can cause acute or chronic health effects, depending on the nature and toxicity of the substances and their concentration in the workplace.

There is no doubt that climate change is a threat to human well-being and the health of the planet, according to Mann (2019), who states that this phenomenon is no longer a distant concern: it is happening here and now, directly impacting life on Earth. McMichael (2001) had already warned that the effects of climate change go beyond local economic disruptions, job losses, or the extinction of emblematic species.

This represents a profound compromise of the life support systems on which humanity depends. This compromise directly affects food security and access to drinking water, favoring the emergence of diseases such as malnutrition—considered, according to Ebi (2019), one of the main global risks in a scenario of climate change aggravated by increased carbon dioxide concentrations, which compromise the nutritional quality of food.

Given the above, it is clear that climate change is the greatest threat to human health in history, according to the World Health Organization. It has negatively affected human physical health, and climate impacts are already harming health, contributing to human mortality and morbidity due to extreme heat, pressures on mental health (trauma from very intense events and loss of livelihoods and culture (Chan, 2015), as well as “[...] air pollution, vector-borne diseases, increased hunger and malnutrition [...]” (UN, p. 68, 2023), claiming the lives of approximately 13 million people annually (UN, 2025).

The impacts of climate change on health must be monitored using rigorous indicators to guide global action (Watts (2020); Watts and Haines, 2020). Thus, the implementation and enforcement of effective climate policies can generate direct health benefits by reducing air pollution and promoting physical activity, which needs to be intensified (Haines, 2020). It is necessary to rethink planning policies to protect public health, as many cities and regions are suffering from floods, droughts, more frequent heat waves, and other phenomena. Such episodes can increase the incidence of disease and affect the health of populations (Cavini, 2022).

This shows that climate change is not a future issue, but a current one, and every day the severity of already known problems, such as heart disease, asthma, cancer, , respiratory infections increases. According to Barcellos (2022), major advances in health treatment research are useless unless they are aligned with the quality of the environment, as environmental imbalances have negative effects on society, directly and indirectly affecting human health.

3. METHODOLOGY

This study involved secondary data collection and field research. We searched DATASUS, Information Technology at the Service of the SUS/SUS Hospital Information System, Ministry of Health (MS), delimiting the Araguaia Region in the State of Pará, and

collected quantitative data on hospitalized patients. To understand the perception of professionals and patients about the relationship between diseases and climate change, interviews were conducted in certain health units with individuals linked to these contexts.

Therefore, data collection was first carried out in the DATASUS/Ministry of Health database, using the following delimitation strategies: Araguaia region of the state of Pará, periods from 2014 to 2018 and 2019 to 2024, and the disease that led to hospitalization. Next, field research data were collected through interviews with health professionals and patients at Basic Health Units (UBS). These were applied within a convenience sample, as subjects were selected based on their availability and willingness to participate in the research.

At the end of the data collection, the information was triangulated and analyzed directly by the researchers.

4 ANALYSIS AND DISCUSSION OF RESULTS

When correlating the data shown in Table 1 with the concerns expressed by both researchers and international organizations, such as the United Nations (UN), there was a significant increase in the number of hospital admissions associated with the diseases highlighted in the surveys. This growth reveals not only an intensification of clinical conditions, but also suggests a possible convergence between the environmental, social, and health impacts that permeate local and global contexts.

Analysis of the data obtained showed that there was a significant increase in cases of disease in the region, and when correlating them with the literature, it can be said that climate variations contributed, especially according to Ministry of Health records, a significant increase in cases of mental and behavioral disorders in all age groups, with increases of 300% among children, 963.15% among young people, 563.19% among adults, and 266.66% among the elderly. Neoplasms also increased, especially in adults (129.13%) and children (78.72%). Digestive system diseases also increased by 49.09% among children, 19.00% among young people, 50.49% among adults, and 58.96% among the elderly population.

Circulatory system diseases decreased among young people (-75.29%) and adults (3.22%) but increased among children (98.61%) and the elderly (29.61%). Infectious and parasitic diseases increased, but without hospitalization, the participants reported a significant increase. The picture is almost the opposite for some infectious and parasitic diseases, which decreased among children (-21.78%) and young people (-7.26%), but increased among adults (58.89%) and the elderly (70.96%).

Table 1 – Comparative hospitalization reports between the periods 2014 to 2018 and 2019 to 2024 in the Araguaia Region in the State of Pará

| DISORDERS | Children 1 to 9 years old | | Evolution (%) | Young people 10 to 19 years old | | Evolution (%) | Adults 20 to 59 years old | | Evolution (%) | Seniors 60 years older | | Evolution (%) |
|---|------------------------------|---------------|------------------|---------------------------------------|---------------|------------------|------------------------------|---------------|------------------|---------------------------|---------------|------------------|
| | 2014- 2018 | 2019- 2024 | | 2014- 2018 | 2019- 2024 | | 2014- 2018 | 2019- 2024 | | 2014- 2018 | 2019- 2024 | |
| Some infectious and parasitic diseases | 7504 | 5869 | -21,78% | 2765 | 2564 | -7,26% | 8979 | 14267 | 58,89% | 3806 | 6507 | 70,96% |
| | 47 | 84 | 78,72% | 36 | 42 | 16,66% | 1730 | 3964 | 129,13% | 355 | 463 | 30,42% |
| Neoplasms (tumors) | 341 | 609 | 78,59% | 226 | 361 | 59,73% | 2104 | 3036 | 44,29% | 2426 | 3220 | 32,72% |
| | 4 | 16 | 300% | 19 | 202 | 963,15% | 163 | 1081 | 563,19% | 24 | 88 | 266,66% |
| Nutritional and metabolic endocrine diseases | 261 | 432 | 65,51% | 202 | 292 | 44,55% | 806 | 1428 | 77,17% | 390 | 705 | 80,76% |
| | 72 | 143 | 98,61% | 255 | 186 | -75,29% | 6571 | 6359 | -3,22% | 6418 | 8319 | 29,61% |
| Mental and behavioral disorders | 7733 | 8820 | 14,05% | 2370 | 2587 | 9,15 % | 7878 | 10571 | 34,18% | 5866 | 8051 | 37,24% |
| | 1609 | 2399 | 49,09% | 1552 | 1847 | 19,00 % | 9080 | 13665 | 50,49% | 2812 | 4470 | 58,96 % |
| Diseases of the nervous system | 510 | 372 | -27,05% | 250 | 394 | 57,6 % | 989 | 1884 | 90,49% | 289 | 570 | 97,23% |
| | 1280 | 1243 | -2,89% | 3167 | 2758 | -12,91 % | 1342 2 | 14719 | 9,66% | 3591 | 4378 | 21,91% |

Source: authors.

In contrast, respiratory diseases - especially bronchitis - as well as vector-borne diseases such as dengue and chikungunya during rainy periods were reported in the data obtained from professionals and patients at Basic Health Units (UBS) in the region. These records indicate that peaks in incidence are strongly associated with abrupt temperature variations and the predominantly dry climate of the Araguaia Region. It was also found that the groups most vulnerable to these conditions are children, the elderly, pregnant women, and individuals in socially vulnerable situations. Among those affected, approximately 80% reported not needing hospitalization and were undergoing drug treatment at home.

From the perspective of the population served and health professionals, the greatest demand at the UBS is related to respiratory conditions, especially those that do not require hospitalization. In contrast, cases that result in hospitalization are mostly linked to physical and mental exhaustion and high blood pressure. Interestingly, there is no widespread perception that such conditions may be related to climate change in the region.

5 CONCLUSION

The population's limited perception of the influence of climate change on their health also points to the need for more effective educational and communication strategies capable of promoting awareness and collective engagement, because the correlation between DATASUS data, Information Technology at the Service of the SUS / SUS Hospital Information System - Ministry of Health (MS), and scientific and institutional alerts shows a scenario of worsening public health conditions, strongly influenced by climate change. The significant increase in hospital admissions and the incidence of mental disorders, neoplasms, and digestive diseases, especially among the most vulnerable age groups, reveals not only the intensification of clinical conditions but also the interdependence between environmental, social, and health factors.

Given the above data, the concerns of the local population, and warnings issued by international organizations such as the UN, it is clear that the impacts of climate change on public health transcend the realm of hypothesis and materialize in concrete patterns of illness. Abrupt temperature variations, alternating periods of drought and intense rainfall, and environmental degradation have contributed to the resurgence of respiratory diseases and arboviruses, disproportionately affecting the most vulnerable groups—children, the elderly, pregnant women, and populations at social risk.

Although the population sees these as isolated health problems arising from climate issues, related to respiratory problems and not always requiring hospitalization, the significant increase in occurrences and the overload of primary care services reveal a structural fragility that requires integrated and intersectoral responses.

6. REFERENCES:

- BARCELLOS, Christovam; QUINTÃO, Aline; MUCCI, Leonardo (org.). Climate change, disasters, and health. Rio de Janeiro: Editora Fiocruz, 2022.
- BRAZIL. Ministry of Health - SUS Hospital Information System. 2025. abnet.datasus.gov.br/cgi/deftohtm.exe?sih/cnv/nipa.def
- CAVINI, Regina. Climate and health series: expert talks about the importance of education in the fight against disease. Fiocruz News Agency, Rio de Janeiro, 2022. Available at: <https://agencia.fiocruz.br/serie-clima-e-saude-especialista-fala-sobre-importancia-da-educacao-na-luta-contradoencas>.
- CHAN, Margaret. World Health Organization. 2015. Available at: <https://who.int>.
- EBI, K. L. Climate change, nutrition, and public health. Overture Global, 2019.
- FRUMKIN, H. et al. Climate change: The public health response. American Journal of Public Health, v. 98, n. 3, p. 435-445, 2008.
- HAINES, A.; WATTS, N. Health co-benefits of climate action. The Lancet, v. 395, p. 2109-2128, 2020.
- INCA - José Alencar Gomes da Silva National Cancer Institute. Air pollution, cancer, and other diseases: what you need to know. / José Alencar Gomes da Silva National Cancer Institute. – Rio de Janeiro: INCA, 2021.
- MANN, Michael E. Climate change is not a distant problem... Climate Change Guide, 2019.
- MCMICHAEL, A. J. Climate Change and the Health of Nations. Oxford: Oxford University Press, 2001.
- UN - United Nations - Causes and Effects of Climate Change. 2025. Available at: <https://www.un.org/pt/climatechange/science/causes-effects-climate-change>
- UN - United Nations - CLIMATE CHANGE 2023 Summary Report. UN/IPCC (Intergovernmental Panel on Climate Change), 2023. Available at: file:///C:/Users/fabya/OneDrive/Applications/%C3%81rea%20de%20Trabalho/ARTIGOS%20PARA%20CORRIGIR/IPCC_AR6_SYR_LongerReport_PO.pdf
- ORTNER, Hans-Otto. The scientific evidence is unequivocal... Climate Change Guide, 2022.
- PATZ, J. A. Climate change and global health: the threat and the opportunity. Here and Now, Sept. 23, 2016.
- SALDIVA, Paulo. The day after tomorrow. Pesquisa FAPESP Magazine, São Paulo, no. 139, Apr. 2008. Available at: <https://revistapesquisa.fapesp.br/o-dia-depois-de-amanha>.
- WATTS, N. et al. The 2019 Lancet Countdown. The Lancet, v. 394, p. 1836-1878, 2019.